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# CHEMICAL PROCESSING

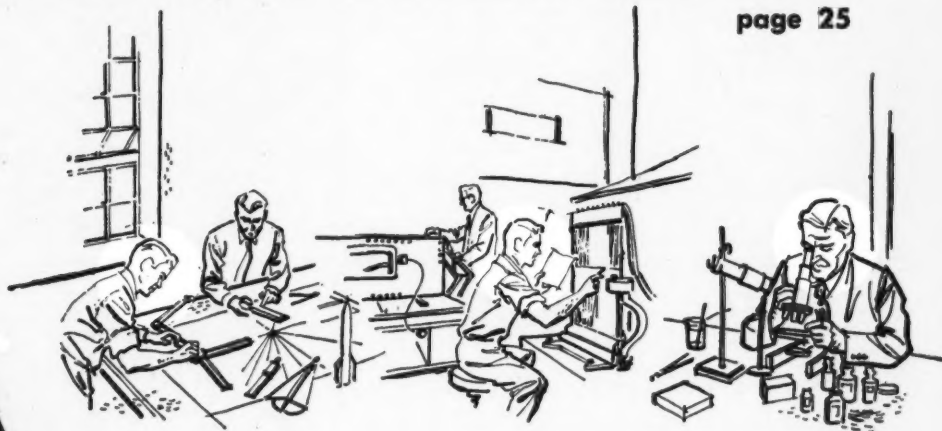


**VICTOR PRESIDENT ROTHE WEIGEL**

His company's "Talent Scouts" competition  
suggests ways of . . .

**LICKING TOMORROW'S MANPOWER PINCH**

page 25



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CP-12

Check 2412 opposite last page.



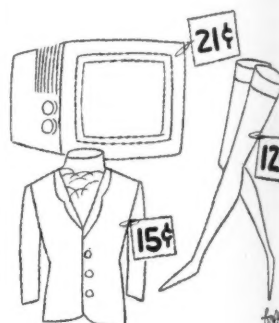
that's interesting

## Unusual behavior

A chemical surprise has been developed at Eastman Kodak's Distillation Products Industries Div. A distilled monoglyceride, when stirred into water, instead of forming an emulsion as expected with such a combination, "gels" into a firm, plastic-like form. For full details — see page 76.

## Chemical costs

The seemingly fantastic price tags shown here point out the dividends we receive from the role chemicals play in our daily life. About 17c worth of luminescent chemicals and phosphors brings a television



screen to life. Add 4c for the silicate that bonds them to the glass and the total is 21c. Only 12c worth of raw nylon makes up the 5437 yards of yarn knitted into one pair of 51-gage, 15-denier stockings. A 15c investment in dye, colors a man's suit or a woman's dress.

## Taking a long look

Look 90 feet around a corner? That's what General Electric's engineers have done with what is believed to be the longest periscope yet constructed. A long aluminum tube with an intricate mirror and lens system permits atomic workers to sit safely behind heavy shielding while they watch performance of a nuclear reactor.



...Thought-provoking slants  
on projects and products

### Dreamy drugs

Another link in the chain to a cure for mental illness was described by Mrs. Anita M. Paradies, of Chas. Pfizer & Co., at the 132nd National ACS Meeting. Four hallucination drugs have been isolated from two plants chewed by Peruvian Indians to produce "beautiful visions". Natives chew plants as intoxicants, sometimes two different plants together. The belief is that one plant cancels out any unpleasant visions produced by the other, leaving only the beautiful visions.

### Aid to communications

Use of crystal filters is expected to result in radio or radar receivers with fewer parts and which will not normally have to be aligned once they are manufactured. Quartz crystals, about one-half size of a small silver coin, are extremely stable under severe environmental conditions.

### Hot under the collar

A pill that causes the body to generate heat might be a new addition to Air Force survival kits if tests now in progress are successful. Gly-



"I think Ugdoock took too many of those heat-generating pills."

cine, and amino-acid, increases the amount of heat generated by the body. This might enable a man to stay alive longer in icy waters or extremely cold climates. (Data)

# SIX ways to improve bulk handling efficiency...

...WITH  
**AIRSTREAM  
CONVEYORS**

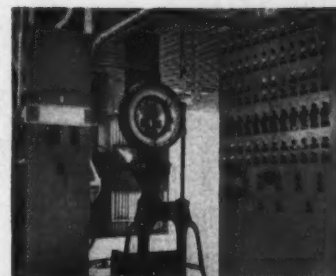
## 1. ELIMINATE MULTIPLE HANDLING

National Cranberry Association replaced costly six-step manual handling of frozen cranberries with a one-step Airstream System. Labor costs are down 90%.



## 2. REDUCE LABOR COSTS

One man at this panel controls a complex 3000-foot Airstream Conveyor at a large synthetic fiber plant. Since previous method required 30 men, labor costs have been cut 96%!



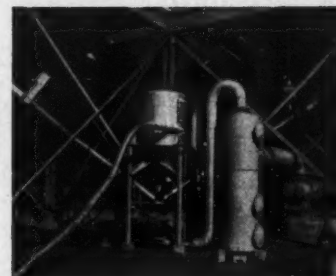
## 3. HANDLE SEVERAL MATERIALS WITH ONE CONVEYOR

Giant automotive foundry unloads boxcars of eight different materials with one Airstream System. Self-cleaning conveying lines permit quick change-over without intermixing one material with another.



## 4. AVOID CONTAMINATION

Tennessee Eastman Company unloads hopper cars of Tenite polyethylene with an Airstream Conveyor. Absolute product purity is protected by (1) enclosed stainless steel system, and (2) filtered conveying air.



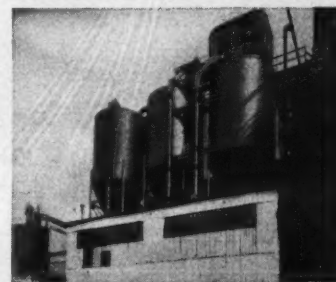
## 5. PREVENT MATERIAL BREAKAGE

A friable filter aid is conveyed by Airstream Conveyor for Eli Lilly & Company at 7½ tons per hour. Specially engineered system cushions moving material and prevents damage to particles.



## 6. MINIMIZE INSTALLATION COSTS

By installing an Airstream System to convey pulverized coal, Standard Forgings Corp. cut first cost 60% below a comparable mechanical conveyor. System goes under railroad tracks and around building; savings are \$35,000 per year.



If you are looking for a conveyor with one—or all—of these advantages, investigate Dracco Airstream Conveyors. Dracco has extensive experience in designing and manufacturing modern automatic handling systems to meet these and other requirements. For more details, write for Bulletin 529.

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dust control equipment

Check 2413 opposite last page.



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and Chemical Business

*For the management team*

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December 1957

No. 12

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This issue of CHEMICAL PROCESSING magazine distributed to more than 50,000 members of the Management Team, wherever chemicals and chemical processes are involved:

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Soap & cleansing products  
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Fertilizers

Animal & vegetable oils & fats  
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### Other industries utilizing chemicals or chemical processes

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Check 2414 opposite last page.

## THAT'S INTERESTING

### Details take time

Development of auxiliary power supplies for any space ship may require as much effort as development of main engine. Engineers of Aerojet General Corp., believe that compact, reliable, auxiliary systems will be essential for heat, pressurization, and communication.

### Quick quest for mercury

A "production line" method of detecting mercury poisoning has been developed by Sidney Nobel, a research chemist at Brooklyn Jewish Hospital. Urine from the victim is treated with copper salt and hydrazine to convert mercury, he may have picked up, to metallic mercury. This is oxidized by potassium permanganate, and reacted with dithizone which forms a golden-yellow color in presence of mercuric ion. (From a paper presented at 132nd National ACS Meeting.)

### Biggest yet in mica

Over 80,000 pounds of raw material were used in largest commercial melt of synthetic mica yet attempted. Purpose of large melt was to produce bigger and better crystals of this important material for high-temperature electrical and electronic equipment applications in excess of 1000°F.

### Fishing season(ing)

Trout benefit from paprika—both in and out of the frying pan. "Tame" trout, raised commercially, very seldom achieve the brilliant markings normally found on "wild" trout. Strange as it seems, if commercial fish food is augmented with paprika the intensity of coloration is increased until the tame fish resemble wild trout, although the shades of color are somewhat different. (Serenader, Gentry Div. of Consolidated Foods Corp.)

To page 238



### WHAT BUT A BELT CONVEYOR could carry this load for so few pennies a ton?

Moving at high speed—24 hours a day if required—belt conveyors handle huge tonnages in a continuous stream. Loading and unloading delays are eliminated,

and there's no time lost on empty return runs. Operating costs are relatively low, based on cost per ton handled. In fact, economies of belt conveyor operation and upkeep generally top any other form of bulk material transportation. And thanks to their extreme flexibility, installation is easy even in difficult locations.

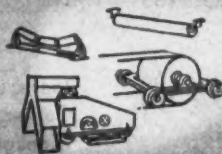
### WHO BUT LINK-BELT offers such a complete belt conveyor service?

For any requirement—new installation or modernization job—Link-Belt will plan it, equip it, erect it and stand behind it. Our engineers can choose from industry's

most comprehensive idler line—plus a broad range of pulleys, drives, terminal machinery and auxiliary equipment. Because all drawings and equipment come from one source, responsibility is centralized . . . no need to waste valuable engineering man-hours coordinating drawings from several sources.



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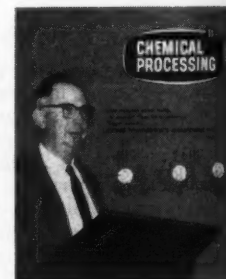
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## THIS MONTH'S COVER

... shows Victor Chemical's President, Rothe Weigel, originator of the company's "Talent Scouts" competition which sought a solution to the problem of the impending shortage of scientists and engineers. Victor was deluged by entries suggesting ways to insure adequate future supplies of technical manpower. On page 25 Chemical Business Editor Bill Schremp highlights some of the suggestions and tells of the overall views of the contributors.



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## SPECIAL READER SERVICES

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### Chemical Technology's Big Challenge

According to many reliable scientific sources, our fossil fuel reserves will not be sufficient to meet increasing world energy demands in the not-too-distant future. And as they become more scarce, cost of recovery will become prohibitive. Nuclear power will help greatly in meeting energy needs, but it too is dependent upon a limited mineral reserve. What can be done to supplement fossil fuel and nuclear energy reserves? An increasingly probable solution is the utilization of solar energy.

Enough solar energy falls on the United States every 20 minutes to fill the country's entire power needs for one year. How can we put this inexhaustible supply of energy to work efficiently at a competitive price? This is the great challenge facing chemical technology.

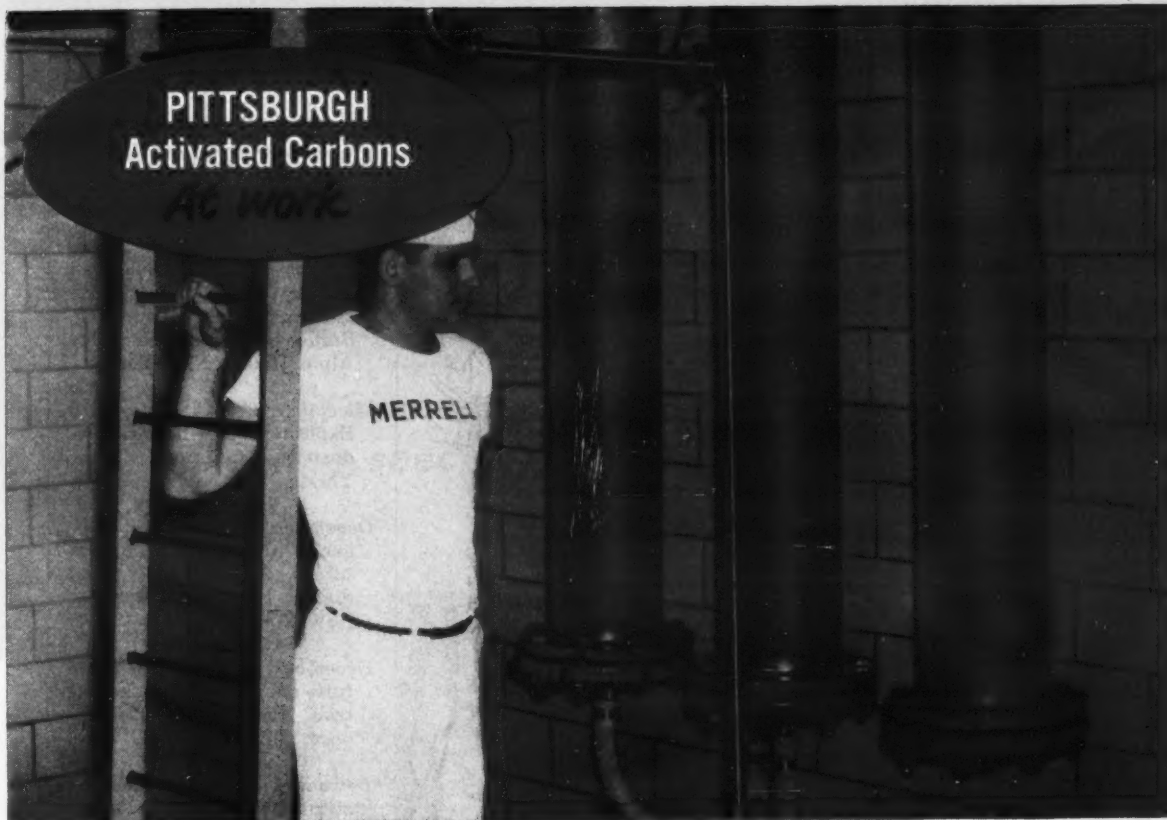
Farrington Daniels, 1957 Priestly Medalist and one of the foremost advocates of solar energy's utilization, has said that chemical technology will play an important part in the efficient development of many of the potential uses of solar energy. It is needed to supply new ideas, new materials, and new ways to improve efficiencies.

Although most solar energy utilization is still in the preliminary experimental stages, progress has been made toward effectively harnessing the sun's power. Probably the foremost area of utilization is in solar energy space conditioning — heating and cooling buildings. It is being accomplished by using solar energy alone, or in conjunction with the heat pump to achieve the most efficient result. For an account of how this is being done, read the article on page 96 by Dr. R. C. Jordan of the University of Minnesota's Dept. of Mechanical Engineering.

*John C. Stevens*

Assistant Editor

DECEMBER 1957



## Decolorizing Costs Cut 75% with Pittsburgh Granular Carbon in a Column System

SEARCHING for a better way to decolorize and remove flavor from glucose-sugar solutions, the William S. Merrell Co., Cincinnati, a division of Vick Chemical Company, recently converted its batch adsorption process to Pittsburgh Granular Carbon in a fixed bed column system. Formerly, the solution, made from broken and off-size throat lozenges, was treated in slurry tanks with pulverized carbon and filtered. With its new column system, Merrell upped efficiency and reduced its processing costs 75%. Comparative cost figures are as follows:

### PER 1000 LBS. REWORK PRODUCT

	Old Method	New Method
Direct Labor	\$11.40	\$2.50
Carbon Cost	3.90	1.98
Filter Aid Cost	1.26	—
	\$16.56	\$4.48

What's your adsorption problem? Tell us about it on your letterhead. Information, samples and technical assistance are available without obligation.



### FREE BOOKLET AVAILABLE

"Pittsburgh Activated Carbons" is a new booklet describing use of Pittsburgh Carbons in both liquid and vapor phase applications . . . Write for your copy now!



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Check 2416 opposite last page.

## Here's A Positive Approach to Lower Sealing Costs



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This service is being given without obligation. The "John Crane" man has even suggested a few trial installations to prove the effectiveness of his recommendations. In the end, you'll be well ahead with sealing methods substantially better than those you are now using.

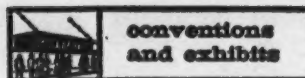
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**CRANE PACKING COMPANY**

Check 2417 opposite last page.



Meetings and shows of interest to the chemical processing industries

**December 1-6.** The American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin Hotels, New York.

**December 2-6.** Twenty-sixth Exposition of Chemical Industries, Coliseum, New York.

**December 4.** Synthetic Organic Chemical Manufacturers Association, annual dinner, Hotel Roosevelt, New York.

**December 5-6.** Illinois Institute of Technology, Industrial Engineering Conference, Chicago.

**December 8-11.** American Institute of Chemical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

**December 8-11.** Eastern Joint Computer Conference, Park Sheraton Hotel, Washington, D. C.

**December 9-11.** American Pharmaceutical Manufacturers Association, combined Mid-year and Eastern Section meeting, Waldorf-Astoria Hotel, New York.

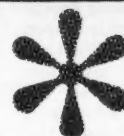
**December 9-12.** Chemical Specialties Manufacturers Association, Forty-fourth annual meeting, Hollywood Beach Hotel, Hollywood, Florida.

**December 10-11.** Society of the Plastics Industry, 8th SPI Film, Sheet and Coated Fabrics Division Conference, Commodore Hotel, New York.

**January 2-3.** American Chemical Society, Division of Industrial and Engineering Chemistry, Christmas Symposium, Case Institute of Technology, Cleveland.

**January 27-29.** American Society of Heating and Air-

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Check 2418 opposite last page.  
**CHEMICAL PROCESSING**

Condition annual Pennsylv

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DECEM



Conditioning Engineers, Inc., annual meeting, Pittsburgh, Pennsylvania.

January 27-30. Plant Maintenance and Engineering Show, International Amphitheatre, Chicago.

January 28-31. Society of Plastics Engineers, Inc., Fourteenth ANTEC "Progress Through Plastics Engineering," Sheraton-Cadillac Hotel, Detroit, Michigan.

February 4-6. Society of the Plastics Industry, Inc., 13th Annual Technical and Management Conference, Reinforced Plastics Division, Edgewater Beach Hotel, Chicago.

March 17-21. International Atomic Exposition, Inc., International Amphitheatre, Chicago.

March 17-21. National Association of Corrosion Engineers, Annual Conference and Exposition, Civic Auditorium, San Francisco.

April 1-3. The American Society of Mechanical Engineers, Conference of ASME Division of Instruments & Regulators, University of Delaware, Newark, Delaware.

April 13-17. Third Pacific Chemical Exposition, sponsored by The California Section, American Chemical Society, Civic Center Exhibit Hall, San Francisco.

April 13-18. American Chemical Society, 133rd national meeting, Civic Center Exhibit Hall, San Francisco.

April 20-23. American Institute of Chemical Engineers, Sheraton-Mt. Royal Hotel, Montreal, Canada.

April 21-23. American Oil Chemists' Society, spring meeting, Peabody Hotel, Memphis.

April 27-May 1. The Electrochemical Society, Inc., Statler Hotel, New York.

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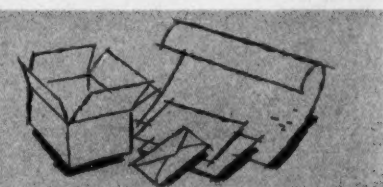
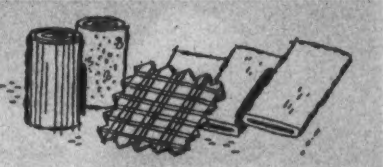
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**SOHIO CHEMICAL COMPANY**

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Check 2419 opposite last page.

## How Crane quality pays off at Crosby Chemicals, Inc.



### These valves resist corrosion from hot fatty acid

In reading this case history from Crosby Chemicals, Inc., Picayune, Miss., you'll recognize why Crane quality pays off again and again by cutting maintenance costs.

The valves you see here are Crane 1-inch No. 18845 stainless steel gates installed on the heat control line to a resin retort. They are subjected to corrosive effects of hot fatty acids as well as resin fumes. Valve operation is frequent—whenever heat control is required and every time batches are changed.

Despite over a year of this severe service,

these Crane valves haven't needed a nickel's worth of maintenance. The owner reports no galling, no seizing, no leakage, no evidence of corrosion. Although not ordinarily recommended for steam applications, these Crane 18-8 SMO valves are holding up on this rugged, high-temperature service because their unique split-wedge disc construction permits: (1) free disc rotation with precision guidance, and (2) gives uniform distribution of seating loads. Together, these features avoid galling of seating surfaces, reduce wear, and assure smooth, easy operation under all conditions.



For information on the complete Crane line of stainless steel valves, ask your Crane Man for a copy of folder AD-2080.

## CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Check 2420 opposite last page.



looking ahead  
to next month

### Congress re-convenes . . .

. . . and January's issue of **CHEMICAL PROCESSING** will bring you an up-to-date report on the legislation before the next session which will affect the chemical industry. Tariffs, taxes, the "good faith" bills, antitrust legislation, a complete sweep of the proposed laws to be watched by you in the chemical field.

And George P. Larrick, Food and Drug Administration Commissioner, tells about the legislation he will support in the next session.

### Paint Industries meet, CP reports

What's new in the paint industry? In next month's **CHEMICAL PROCESSING** you'll find a full report on the newest developments and ideas seen at the 35th Annual Paint Industries meeting and exhibit at Philadelphia. CP visited the show and will bring you the highlights of the new materials and equipment exhibited. Also to be discussed: the latest on techniques for reproducing and matching paint colors, control of adhesion, use of solvents and additives, and material handling.

### Chemical Industry in 1958

. . . and still it grows. Despite the so-called "profits squeeze" and the much-discussed but never quite attained "growth plateau," the chemical industry still maintains its phenomenal growth rate — about three times the average of all industry.

But what will 1958 bring to the business of making and selling chemicals? To get the answer, **CHEMICAL PROCESSING** asked leaders of the industry — top management from top companies in major segments of the chemical industry — to reply to the question, "What factors or trends in the business picture will have the greatest effect on the



chemical industry in the coming year?"

Their answers reflect the thinking of marketing, of research, of the men concerned with the growth and financial health of the industry.

For a preview of 1958, read the first-of-the-year feature, "The Leaders Speak", in the January CHEMICAL PROCESSING.

#### Ample, clean water

The related problems of pollution control and water conservation are becoming more important every day. And as the problems grow, so does industry's effort to solve them.

Sun Oil developed a bacterial oxidation process for treating refinery waste waters some time back. The process is performing two different functions at two different plants . . . one, the Toledo, Ohio, refinery where water conservation is the chief concern, and the other, the Sarnia, Canada, plant where the main requirement is that the waste water be clean when it is returned to the stream.

Next month you'll find a complete description of the two installations.

#### Cuts tank truck cleaning time 90 percent

In order to avoid contamination in tank trucks of resins, Reichhold, in the past, put the equipment through an eight-hour cleaning process which ended with a man in a rubber suit going over the inside of the tank with a xylol solution. But the company's new cleaning method allows the trucks to pass a stringent "black light" inspection with only about 10 percent of the previously needed cleaning time.

In next month's Engineering and Maintenance section, you'll learn how Reichhold switched from this procedure to a detergent washing system that cuts the job to less than an hour.

## From Horse-radish...



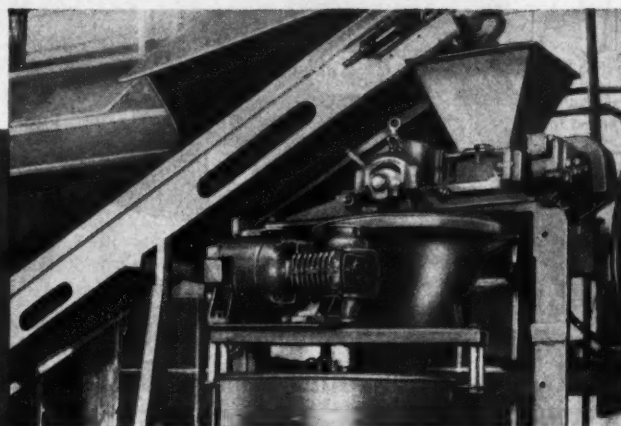
## to Rocket Fuel...

# Mikro-D Handles the **HOT ONES!**



• Custom engineered MIKRO-PULVERIZER installations are handling the *hot* ones for industry everywhere. They put the bite on horse-radish, while keeping it cool as a cucumber, and grind touchy potassium perchlorate for rocket propellants. Special installations have been designed to process virtually every type of material and to meet the most exacting product specifications. What's more, they are available in a wide range of sizes, from small laboratory mills, ideal for product testing, to high capacity units capable of meeting the highest volume requirements. Quality and fineness of grind can be duplicated on every size unit in the MIKRO-PULVERIZER line, permitting accurate prediction of results in advance.

If you would like to see for yourself what a MIKRO-PULVERIZER can do for your product, send us a sample. We'll grind it to your specifications, and perhaps help you discover how to put more profit in your production.



No. 2DH MIKRO-PULVERIZER grinding horse-radish in a food packing plant.



### BULLETIN 51A

describes the complete MIKRO-PULVERIZER line. The principle of operation and typical applications of MIKRO-PULVERIZERS are discussed in detail.

Why not send for your copy today?

# Mikro-D

GENUINE MIKRO-D  
REPLACEMENT PARTS  
AVAILABLE FROM STOCK  
WITHIN 48 HOURS.

## PULVERIZING MACHINERY DIVISION

METALS DISINTEGRATING COMPANY, INC.

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MANUFACTURERS OF PULVERIZING, AIR CONVEYING AND DUST COLLECTION EQUIPMENT

Check 2421 opposite last page.



# New **RIGID** 4PJ Geared Threader \* is now **JAM-PROOF**



## \* Automatically Stops Threading After Standard Length Thread Is Cut

Power drive threading is safe and easy with this new 4PJ—no more watching of either die stock or drive! 4PJ can't jam—drive pinion kicks out automatically after full thread is cut. Extra-easy to handle... mistake-proof workholder, no bushings... fully enclosed gears... **RIGID** most-for-your-money—Buy new 4PJ at your Supply House!

The Ridge Tool Company, Elyria, Ohio, U.S.A.



Check 2422 opposite last page.



## letters from readers

... Notes and comment from our readers

### The Company Psychiatrist

Dear Sir:

Your article in the October 1957 **CHEMICAL PROCESSING** (page 46), in which Dr. W. D. Woodward told the story of the industrial psychiatry program at American Cyanamid Company, caught my eye and I read it with interest. You mention that there are a small number of other companies who employ a psychiatrist full time.

To help me discover companies that emphasize industrial psychiatry I wonder if you can enumerate the four or five companies which you say employ a psychiatrist full time. I would also appreciate references to information on the industrial psychiatry programs of these companies.

I am an engineer with a company in the Southwest. My interest in industrial psychiatry stems from the recognition that the psychotherapy I have received from psychiatrists has provided the solution to my own problems which are similar to the problems toward which Dr. Woodward has directed the American Cyanamid industrial psychiatry program. However, I have sought out my psychia-

tric help without the benefit of a company-sponsored industrial psychiatry program. To my knowledge our company does not have such a program. Of course our Medical Department does refer occasional cases to private psychiatrists. I think our company can benefit by establishing a formal program of industrial psychiatry.

I want to learn what I can about programs in industrial psychiatry so that I can support such a program if the opportunity presents itself. In this regard whatever comments you are able to make will be appreciated.

A READER

In addition to American Cyanamid, we have been told that Du Pont and Eastman Kodak employ a psychiatrist full time. It is suggested that you contact the Director of Public Relations at these companies for information on their programs. You might also contact Dr. Woodward at American Cyanamid for further information.

We certainly enjoyed your comments and think you have a worthy goal in supporting the more extensive use of industrial psychiatry. —Ed

### Mis-use of Men

Dear Sir:

Your recent articles concerning the apparent shortage of scientific personnel and unionization of engineers and scientists, point up one governing factor in the plight of technical personnel —**MIS-USE**.

At one time it was difficult to find a graduate engineer doing drafting, or a chemist doing routine analyses, except as part of a training program; yet, the predominance of such technical personnel being utilized for such work cannot now be overlooked.

Mr. Amann (**CHEMICAL PROCESSING**, August '57, page 38) pointed out six reasons

for dissatisfaction among engineers. In at least four of those reasons the mis-use of technical personnel may be responsible. Professional recognition is difficult for a person to whom the assignment of non-professional work is a routine matter; the routine work is unrewarding to a truly scientific brain; and the rewarding of routine performance with high salaries and substantial incremental advances is nearly impossible from practical and economic viewpoints. The technically trained man who is doing the work of a technician or a draftsman is in reality no more part of management than

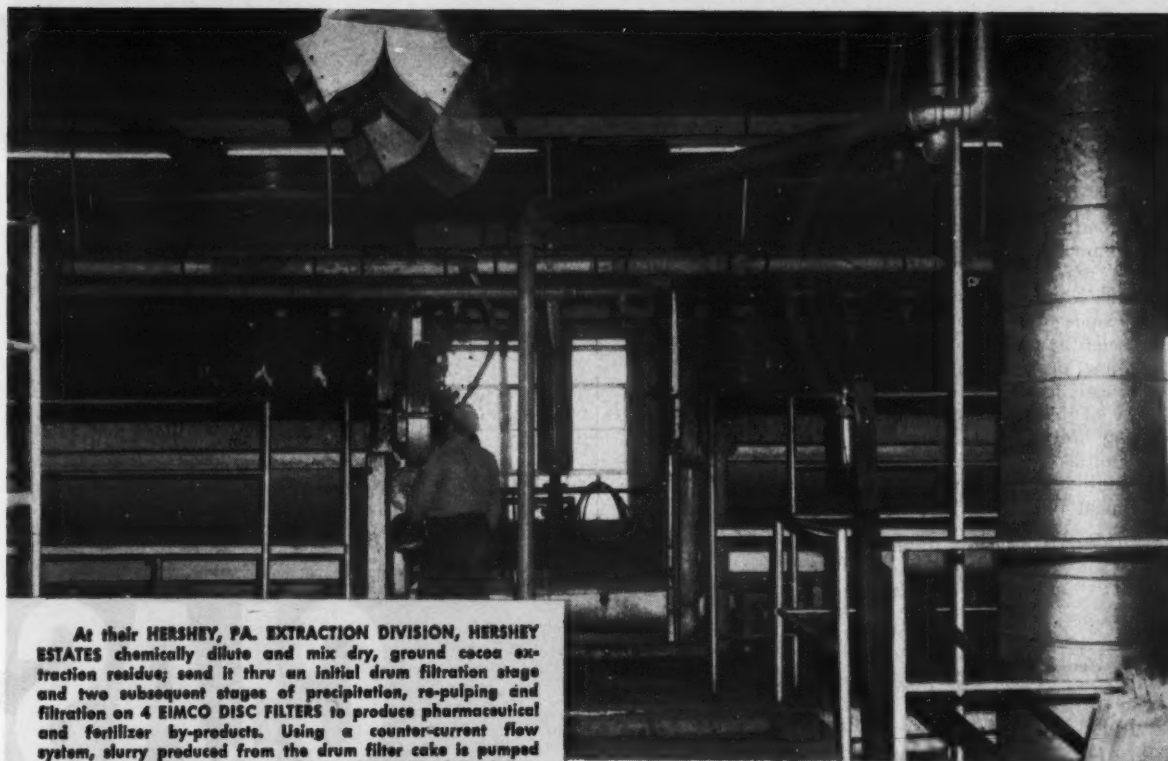
the production operator, the first class maintenance mechanic, or the typist; all specialists in their field.

Mr. Amann states certain goals for the engineers in unions. These goals are not by any means restricted to union members. Moreover, typical union activities could prevent the union engineer from attaining any of his goals. A well-qualified engineer might never reach a management position if the majority of our plants were unionized, since it would become impossible to quit a job with one company to obtain a better, higher-level position with another company. The unions would see to that, under the guise of job security and seniority.

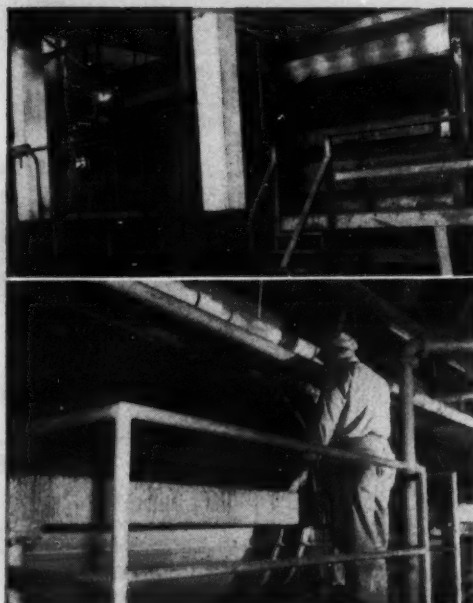
It is sad but true that high salaries do not always serve as incentives for further development of technical competence. In fact, complacency quite often develops where seniority is a large factor in governing raises and salary levels. Technical development and personal growth are not an organization function but an individual prerogative.

Mr. John S. Wilson, (CP, Oct., page 27), in his rebuttal to Mr. Amann points out one of the main reasons why many college graduates fail in industry. The recent college graduates are products of a free-spending era and have been subjected to a lax discipline through most of their academic life. They are unwilling to compete with other technical graduates for promotions, salary increases on a merit basis, and position placement. To these individuals the union appears to be the answer to their problems.

The company that does not wish to properly reward its technical personnel will not be forced to do so by union activity. As pointed out by Mr. Wilson, the evaluation of the contribution of technical personnel to company progress on a daily basis is extremely difficult; therefore, they could probably be dropped from the payroll without unduly affecting the immediate status of the company. It is probable that in



At their **HERSHEY, PA. EXTRACTION DIVISION, HERSHEY ESTATES** chemically dilute and mix dry, ground cocoa extraction residue; send it thru an initial drum filtration stage and two subsequent stages of precipitation, re-pulping and filtration on 4 **EIMCO DISC FILTERS** to produce pharmaceutical and fertilizer by-products. Using a counter-current flow system, slurry produced from the drum filter cake is pumped to Eimco Filter Station No. 1 (large photo). Final Precipitate is gravity fed to Eimco Filter Station No. 2 (directly below), and the end-product is transported to storage on a continuous belt conveyor. Bottom photo shows closeup of Eimco Disc cake formation.



## EIMCO FILTERS - SERVICE WIN HERSHEY'S CONFIDENCE

**HERSHEY, PA.** - Client confidence in Eimco filter equipment and service over a period of 15 years, is expressed by **Mr. H. B. Brewer**, operating manager of the **Extraction Division, Hershey Estates**.

In 1941... it became feasible to add a two stage precipitation, re-pulping and disc filtration process to the flowsheet producing by-products from dry, ground cocoa extraction residue.

**Mr. Brewer** describes operation of two disc filter stations subsequently designed and installed by Eimco, "highly satisfactory. Over a 15 year period of around the clock operation, they have given us a dependable, efficient operation that has increased production and improved product quality."

This performance is a tribute to the durability and high mechanical operating efficiency of **Eimco** equipment and **Hershey's** intelligent maintenance program on a "planned" rather than "emergency" basis. From time to time, **Eimco** engineers and **Hershey** technologists have worked hand in hand to develop improvements to bring plant capacity to its present 90 tons of solids-per-day production.

The skills and experience that have won such lasting client confidence are at your disposal. Write today... there's an Eimco Branch and Engineer in your vicinity.

## THE EIMCO CORPORATION SALT LAKE CITY, UTAH

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Export Office: Eimco Building, 51-52 South Street, New York 5, N. Y.

Process Engineers Inc. Division, San Mateo, California

BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD



B-308

Check 2423 opposite last page.



## LETTERS

some cases no long range effects would result.

To summarize, industry can alleviate the apparent shortage of scientific personnel by proper utilization of technically trained people and, in so doing, many of the points of dissatisfaction would evaporate since the importance of the scientist or engineer would increase proportionately. The technical man can overcome many of his problems by preparing himself for future opportunities and attempting to promote the proper use of technical personnel.

B. W. HIGDON, CHEMIST  
Pampa, Texas

### Nomenclature

Dear Sir:

With reference to . . . the story for September **CHEMICAL PROCESSING**, page 134, please be advised that the enzyme referred to is more properly designated Catalase and not peroxidase.

Catalase is a generic term describing this type of enzyme though the catalases themselves differ materially depending on the source. It is the source of our Catalase that accounts for its remarkable properties.

DON SCOTT,  
Vice President  
Fermco Chemicals, Inc.  
Chicago.

### Technical Salesmen

Gentlemen:

I was particularly interested in your September issue article on "We Need Technical Men in Chemical Sales." The author's analysis of this situation is certainly appreciated in the technical service area where effective operation depends primarily on precise and up-to-date information regarding the customer's technical problems. Customer contact by research and development personnel is, of course, an important and continuing phase of chemical marketing

# BUILT FOR H

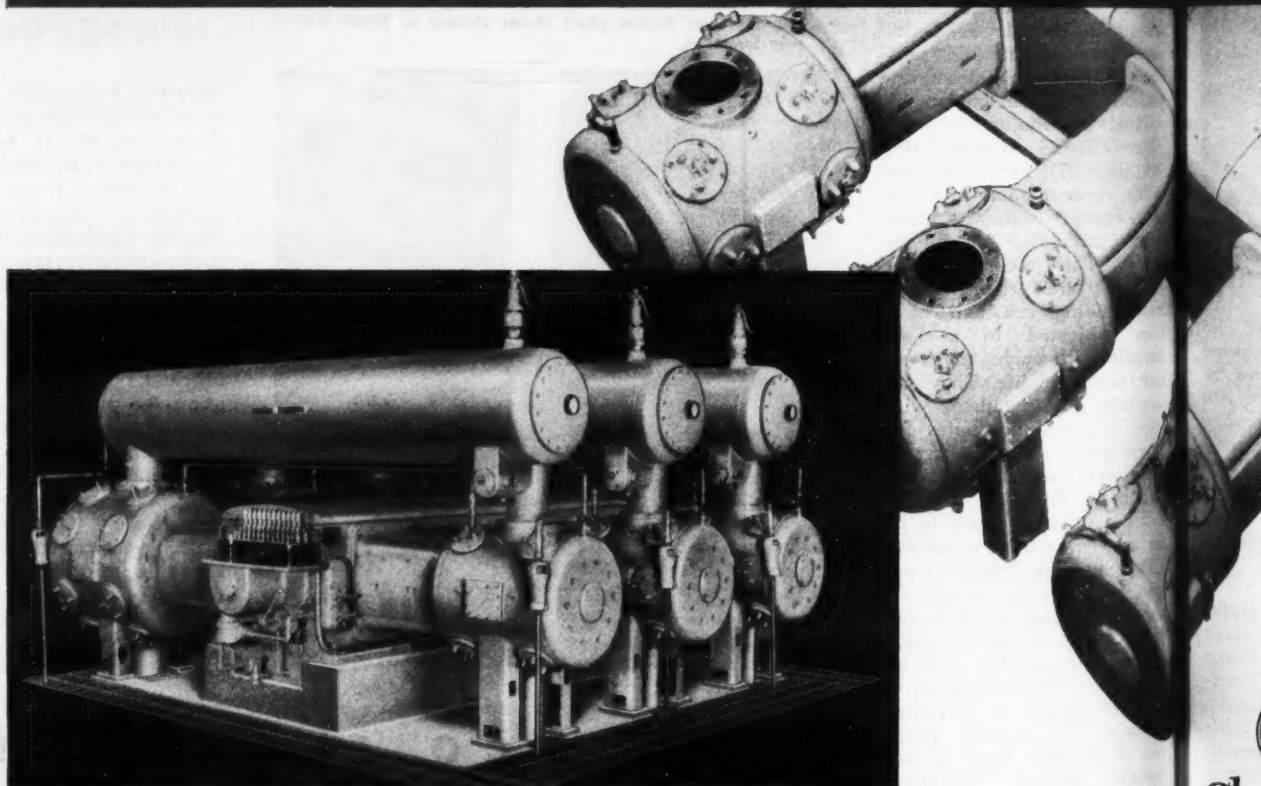
*• for vacuum service*

*or pressures to 15,000 p.s.i.g.*

*• in sizes to 5,000 H.P.*

*• for direct motor mounting,  
flexible coupling or gear drive*

# CLASS FE C

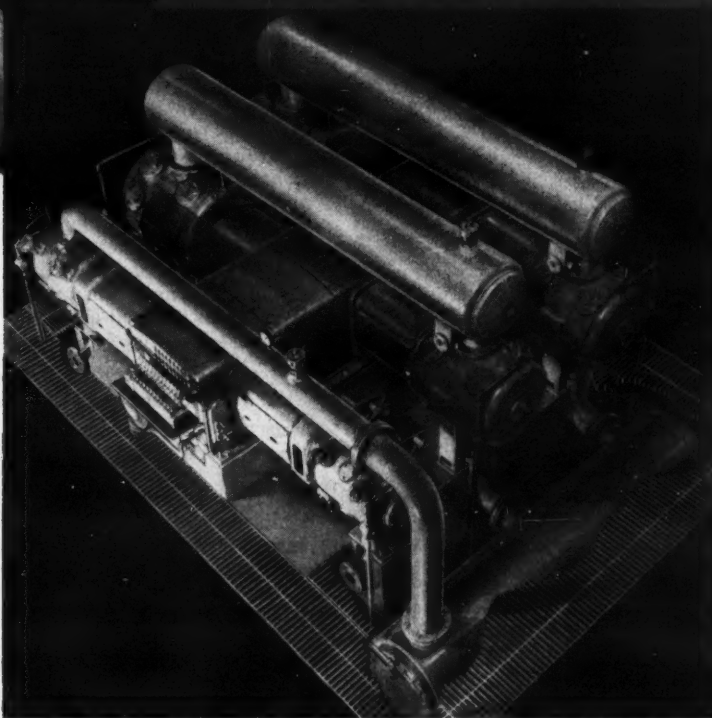
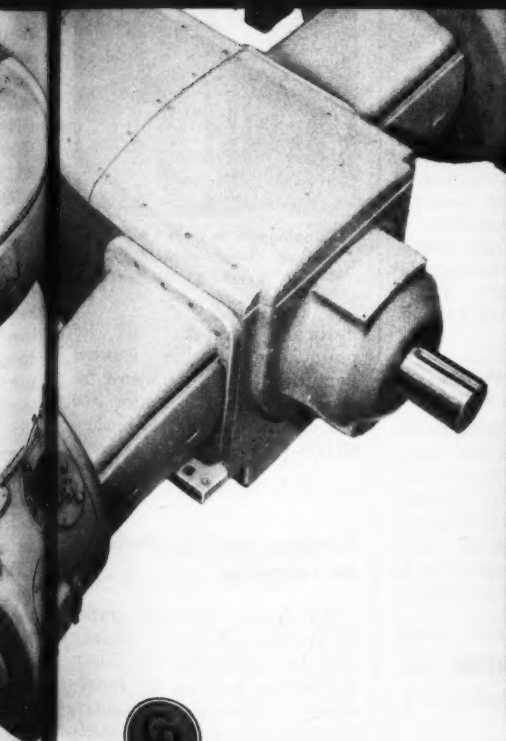


The six-cylinder compressor unit in the background photo above represents but one of numerous cylinder-crankthrow arrangements obtainable with the balanced-opposed Class FE. The unit shown directly above is a two-stage arrangement, 1000 H.P. size, one of two recently purchased by a large engine manufacturer.




# R HEAVY-DUTY

# E COMPRESSORS



The high pressure compressor above is a further example of the flexibility of the balanced-opposed design. Here, the six-cylinder arrangement is used in a 1,250 H.P. three-stage compressor for wind tunnel service.

  
**Chicago Pneumatic**

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

Check 2424 opposite last page.

operations, but the customer's application problems represent a full-time job that must be assumed by the salesman.

In our present sales training program, graduate chemists and engineers will receive a combination of sales and laboratory experience, to give them much more than a talking acquaintance with our Company's present and future products. With a sales force of this type, we in technical service are sure of receiving the type of information we need to give the customer not only a quality product, but a product that fits his rapidly changing needs with particular respect to end-use applications.

F. A. CASSIS

Amoco Chemicals Corporation  
Chicago, Illinois

#### PATENTS

Gentlemen:

... I hope very much that the well planned article which you have caused to be published in this magazine will have very beneficial results. The patent system and the Patent Office seldom are called to the attention of the public and it is indeed fortunate that our friends consider it essential to give us some favorable publicity every now and then.

ROBERT C. WATSON

Commissioner of Patents

US Department of Commerce

The editors of **CHEMICAL PROCESSING** Magazine are always interested in the opinions of our readers, and will publish as many letters as possible in these columns. Address your letters to:

John C. Vaaler, Editor

**CHEMICAL  
PROCESSING**  
Magazine

111 East Delaware Place  
Chicago 11, Illinois

Inconel alloy

21. Which alloys resist corrosion from hot coal tar fractions the longest?

☐ Inconel alloy? ☐ Metal B?

☐ Metal C? ☐ Metal D? ☐ Metal E?

SPPOOL A located in  
425°F vapor connection

SPPOOL B located in  
400°F vapor outlet

## INCO'S in-plant corrosion tests help you answer this kind of multiple-choice question

The alloy samples shown left and right were exposed to 306 days of corrosion.

They were exposed on standard Inco in-plant corrosion test racks in equipment condensing a coal tar fraction containing 5 lbs./1000 gals. of ammonium chloride at approximately 450°F. Nine different types of ferrous and nickel-base alloys were tested.

The story they tell is clear. In this particular equipment, with this particular corrosive, Inconel\* nickel-chromium alloy is the alloy of choice for longest service life.

To the producer concerned, this information was useful in specifying materials for a new condenser. And, by extension, it should prove useful to other makers of coal tar products. But that's not why we're telling you about it.

*More important by far! This demonstrates one of the Inco Corrosion Engineering services that help you answer specific questions of material selection.*

Nearly always these are multiple-choice questions with, as in this case, thousands of dollars hanging on the answer. What Inco does is to go all-out to get the *factual evidence* you need for decision.

### Need Help With a Corrosion Problem of Your Own?

Very often, the answer to a stubborn problem may be found in our codified files, covering thousands of case histories. Where necessary, we will help you initiate an in-plant corrosion test. Simply write to Inco's Development and Research Division. (If you like, we will send you a Corrosion Data Work Sheet, which makes it easy to outline the problem).

\*Registered trademark

**THE INTERNATIONAL NICKEL COMPANY, INC.**  
67 Wall Street New York 5, N. Y.

# INCO NICKEL ALLOYS



## nuclear notes

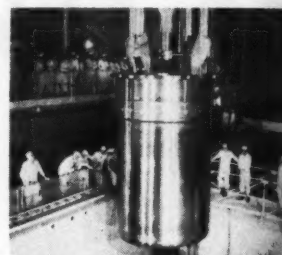
### Produce pure beryllium on commercial basis

Pure beryllium, essential material in construction of nuclear reactors, is being produced on a commercial scale.

The new plant was recently placed in operation by The Beryllium Corporation near Hazleton, Pa. The AEC has contracted for the entire output, at about \$47 per pound.

### Install Shippingport reactor core

The core of the nation's first full-scale atomic-electric generating station has been placed into position at Shippingport, Pa. Weighing 58 tons, the multi-million-dollar core has fuel consisting of 14 tons of



Shippingport reactor core being lowered into position. Core weighs 58 tons

natural uranium and 165 pounds of highly enriched uranium. When completed, the reactor should produce 2000 psi steam at 525°F to produce 60,000-kw minimum power.

### Continue nuclear studies on ceramics

Advanced research studies of nuclear effects on ceramics will be conducted by Gulton Industries, Inc., at the Brookhaven National Laboratory. Studies will concentrate chiefly on electrical measurements of irradiated barium titanate and lead zirconate. It is hoped that by changing the structure of the ceramic materials, improved electrical characteristics will be affected.

Check 2425 opposite last page.

...Significant news about atomic energy

### More uranium located by geochemical tests

A new discovery of uranium ore has been reported by Geo-Resources Corp., and verified by AEC in Spokane, Wash. Project is adjacent to Geo-Resources-DEMA sponsored uranium exploration project in Washington State. Use of geochemistry to locate subsurface uranium is credited with the find.

Geiger counters and geophysical prospecting instruments were unable to locate the deposit due to rock and soil cover which blocked out gamma radiation. Therefore, drilling and bulldozing sites were chosen by interpretation of geochemical tests together with known geological data.

### Predicts safe future for atomic workers

Atomic industrial plants of the future will be safer to work in than conventional plants of today, according to John F. Ege, Jr., director, Industrial Hygiene and Safety Division, Argonne National Laboratory. His conclusion is based on experience to date which shows absence of accidents caused solely from the fact that materials handled were radioactive. Accidents involving radioactive materials can be traced to same causes as those of conventional mishaps; human error, and lack of technical skill, Ege says.

### Bonding technique yields lower cost fuel element

Lower cost fuel elements are reported through use of a solid-phase cold bonding technique. Developed by the Nuclear Products Division of Metals and Controls Corporation, the element is shaped as flat strip and consists of enriched uranium completely clad with zirconium or zircaloy.

Elements pass autoclave  
To page 19

87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS!



## Here are the facts on peak performance, low cost flash coolers

Send for this new booklet—you'll see how the Swenson Flash Cooler can be custom engineered to your exact requirements. Various construction materials, flash nozzles and other adaptations are discussed. Sections of the booklet are devoted to single stage vs.

multiple stage cooling and to flash coolers for heat recovery and heat interchange. Send for this valuable information today! Request Bulletin SW-204, "Swenson Flash Coolers." Swenson Evaporator Company, 15667 Lathrop Avenue, Harvey, Illinois.

# SWENSON

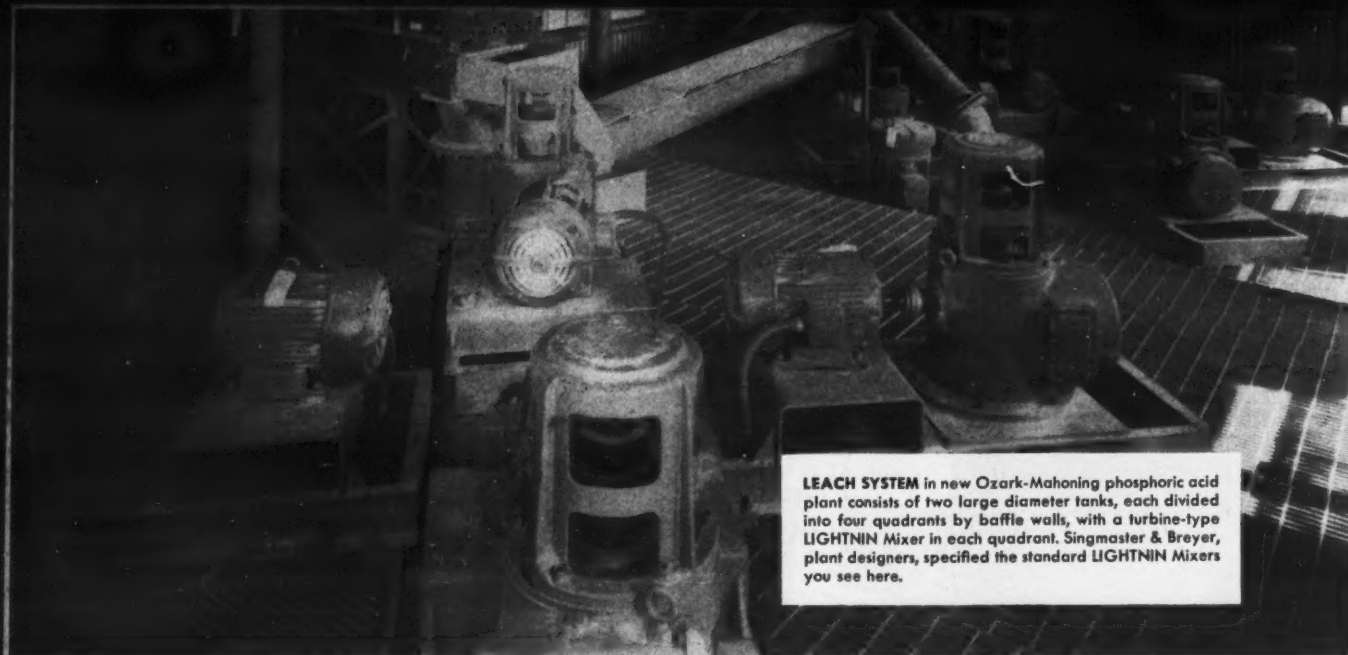
Proved Engineering for the Process Industries

Since 1889



Check 2426 opposite last page.





**LEACH SYSTEM** in new Ozark-Mahoning phosphoric acid plant consists of two large diameter tanks, each divided into four quadrants by baffle walls, with a turbine-type LIGHTNIN Mixer in each quadrant. Singmaster & Breyer, plant designers, specified the standard LIGHTNIN Mixers you see here.

## YOUR OPINIONS —

— and comments on the significant subjects presented in each month's **CHEMICAL PROCESSING** are important! We Welcome your letters expressing your views. In this way others will have the opportunity of hearing your side.

### Perhaps you agree

with what has been said in these articles.

### Maybe you don't.

You might even have a thought or angle which wasn't expressed.

If so, why not let us and others learn your ideas?

Suitable letters will be published in our regular Letters from Readers column, (see page 12 in this issue).

Address . . . your comments to:  
The Editor  
CHEMICAL PROCESSING  
111 E. Delaware Place  
Chicago 11, Illinois

For more information on product at left, specify 2427 see information request blank opposite last page.



## New acid process gives 95% yield with good mixing in leach tanks

More often than you might think, *good mixing of fluids* can make the difference between "just average" and superior process results.

That's one reason why LIGHTNIN Mixers were specified for this new wet-process phosphoric acid plant at Ozark-Mahoning Company, Tulsa, Okla. Singmaster & Breyer, New York engineering firm, did the process and equipment design for Ozark-Mahoning Company.

### High yield—low cost

Utilizing the Belgian Prayon process, relatively new to this country, the plant consistently yields better than 95% of acid containing 30%  $P_2O_5$ . It produces a 32% product from sulfuric acid as weak as 55%.

Leaching temperature is 15-20 degrees cooler than conventional processes—easing the corrosion problem and per-

mitting the use of less costly materials of construction.

The new plant has run without a hitch since the day Ozark-Mahoning operating management pushed the button.

### How mixers help

Good mixing does its job in the leach system, where finely ground phosphate rock is slurried with recycled phosphoric acid, then reacted with sulfuric acid to precipitate gypsum.

A LIGHTNIN Mixer in each of eight leach-tank compartments provides the exact balance of fluid flow and turbulence needed for intimate acid contacting and highest extraction values.

The LIGHTNINs also provide complete uniformity and immediate dispersion of reactants, resulting in the growth of large, easily filtered gypsum crystals.

On *your* next project, why take chances on fluid mixing when you can be *sure*? With LIGHTNIN Mixers, you get the security of knowing there's a mixer to match your requirements *exactly*—with replacement parts always quickly available if you ever need them.

### Predictable results

You're sure about *results*, too—because your LIGHTNINs are selected on the basis of application and test data unique in industry. Many thousands of pilot runs, plus scientific methods of scale-up, insure predictable mixing results that are unconditionally guaranteed.

For quick, competent help in getting a new process started right, or in making an old process more efficient, call your LIGHTNIN Mixer representative. He's listed in Chemical Engineering Catalog. Or write us direct.

## Lightnin® Mixers

MIXCO fluid mixing specialists

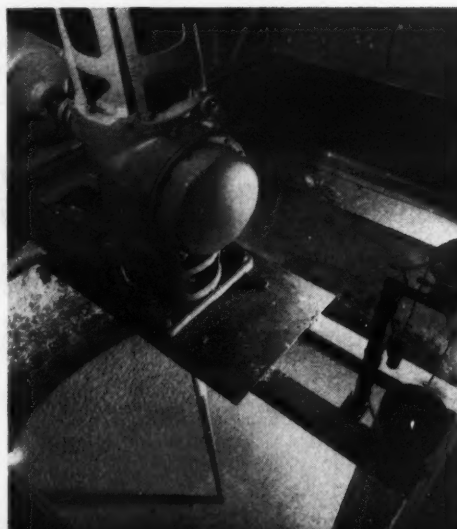
**YOU CAN HANDLE** any fluid mixing job, in tanks of any size or shape, with LIGHTNIN Mixers. Results are fully predictable; unconditionally guaranteed.

FOR LATEST MIXING INFORMATION and full description of LIGHTNIN Mixers, send for these helpful bulletins:

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Top or bottom entering; turbine, paddle, and propeller types: 1 to 500 HP (B-102) | <input type="checkbox"/> Side entering: 1 to 25 HP (B-104)                   | <input type="checkbox"/> Quick-change rotary mechanical seals for pressure and vacuum mixing (B-111) |
| <input type="checkbox"/> Top entering; propeller types: ¼ to 3 HP (B-103)                                  | <input type="checkbox"/> Laboratory and small-batch production types (B-112) |  |
| <input type="checkbox"/> Portable: ¼ to 3 HP (B-108)   | <input type="checkbox"/> Condensed catalog showing all types (B-109)         | <input type="checkbox"/> Data sheet for figuring mixer requirements (B-107)                          |

Check, clip, and mail with your name, title, company address to:

**MIXING EQUIPMENT Co., Inc., 185-n Mt. Read Blvd., Rochester 11, N.Y.**  
In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 10, Ont.



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DECE

## NUCLEAR NOTES

From page 17

tests at 750°F for 5 days. They are reported to be completely corrosion-resistant at high temperatures and have good structural stability after extensive thermal cycling.

(Additional information on fuel element may be obtained from the Nuclear Products Division of Metals & Controls Corporation, Attleboro, Massachusetts.)

Check 2428 opposite last page.

### Gaskets are 35 times more radiation resistant

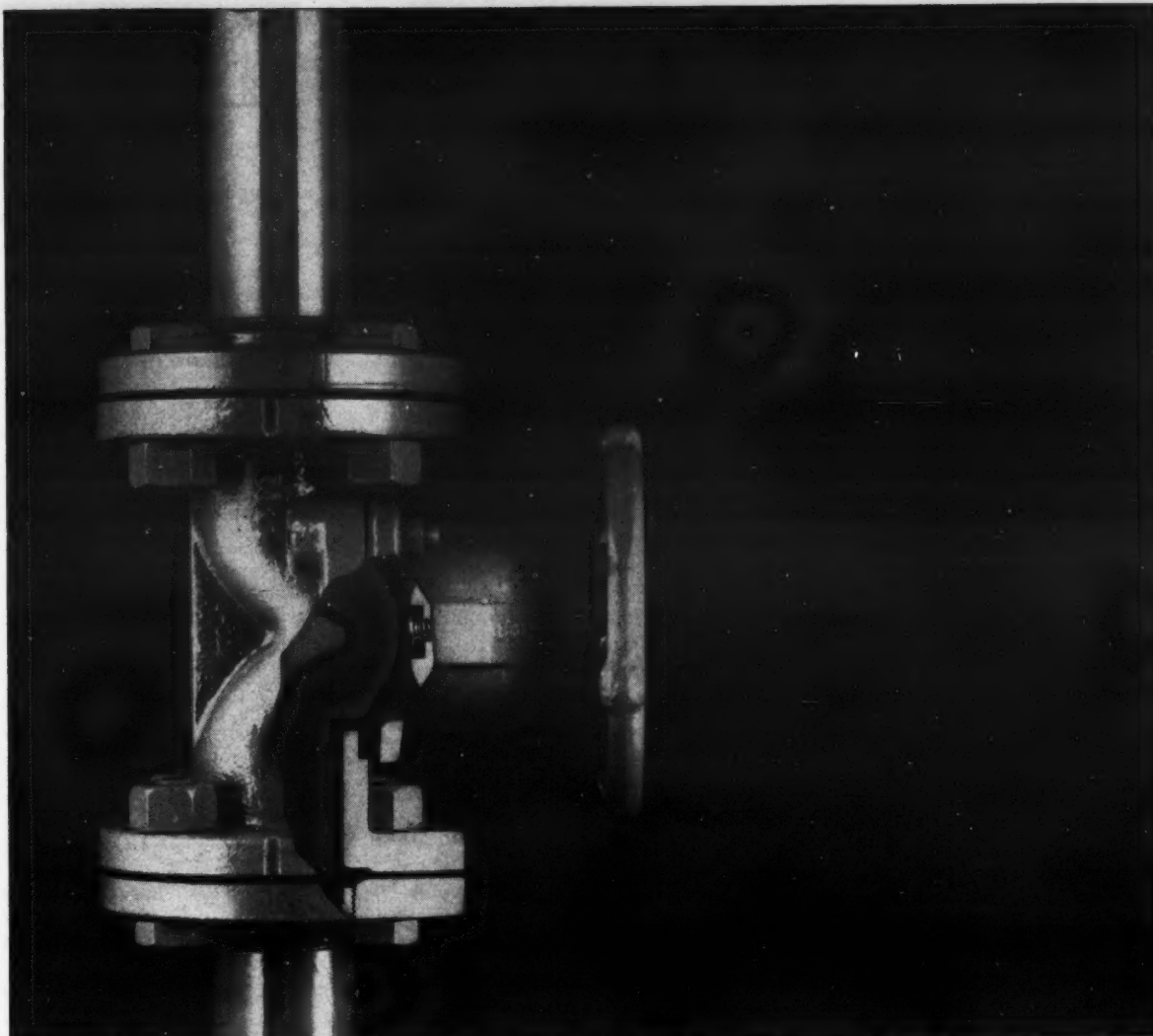
Development of a non-metallic gasketing material that is 35 times more resistant to radiation than conventional materials, was announced at the recent national meeting of the ACS by Dr. John A. Parker of the Armstrong Cork Company Research and Development Center. Material was described as a new type of synthetic composition formulated from certain types of acrylonitrile-butadiene copolymers.

### AEC to stop Cobalt-60 encapsulation service

Indications that private industry is preparing to provide large-source encapsulation service at reasonable price is motivation for discontinuance of AEC Cobalt-60 encapsulation service effective March 1, 1958. This is in line with its general policy to discontinue furnishing services and materials when they become available commercially at reasonable rates.

### Plant expansion planned by AGN in San Ramon

Aerojet-General Nucleonics, San Ramon, California, has purchased an additional two acres of land and has option on 389 acres immediately surrounding their San Ramon facility. The land will be used for expansion of firm's nuclear reactor production.



Corrosion protection is continuous in saran lined pipe—liquid never touches metal.

## You can see why Saran lined pipe prevents corrosion

*Corrosive liquids never touch the rigid steel pipe . . . it's lined with durable saran*

You can stop downtime and other corrosion-caused losses by using saran lined pipe.

The saran liner, over which is swaged a steel pipe, gives complete protection from commonly used acids, alkalis and many other corrosive liquids. At no time do these liquids touch the rigid steel pipe, its fittings or valves.

You'll like the labor-saving way it fabricates. Cutting and threading can be done in the field with conventional hand

or power tools. And you can hang it in the same manner as ordinary steel pipe.

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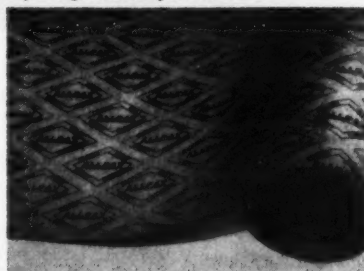


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## recent books

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... summarized for you by authorities in the  
field with the CP staff

### Handbook of Chemistry and Physics — 39th Ed.

The 39th edition of this well-known reference handbook has 50 more pages than last year. In addition to the math tables, physical and chemical tables, specific gravities and properties of matter, heat and hygrometry, electricity and magnetism, light, and conversion data for which the book is so well known, there has been added information about the transuranium elements, sugars, isothermal compressibility of liquids,  $\text{CaCl}_2$  brines, superconductivity of metals and alloys, nuclear spins and moments, and relation of energy mass and velocity for electrons.

Handbook has over 3000 pages, is printed on India paper, and is still only 2 1/2 inches thick.

(To obtain "Handbook of Chemistry & Physics, 39th Ed." remit \$12.00 direct to The Chemical Rubber Co., 2310 Superior Ave., Cleveland 14, Ohio.)

Check 2431 opposite last page.

### Spot Tests in Organic Analysis

Reviewed by JOYCE E. HILL  
858 Forest Dale Drive  
Mobile, Alabama

This completely revised fifth edition of a text by Prof. Fritz Feigl will be a valuable addition to the desk and laboratory bench of chemists undertaking any phase of organic analysis.

As expected, the new 616-page volume incorporates essential and noteworthy additions to the field of qualitative organic analysis which were

not included in the preceding publication. Not only have 80 new tests been fully described, but at least five of the chapters have been more extensively developed and a special chapter of bibliographies added. A new section on the identification of specific pharmaceutical preparations will certainly not be overlooked.

Description of procedures, reagents, limits of detection, and interferences is presented in an uncluttered and logical manner. An excellent coverage of references to the literature has been included.

To this reviewer, the chapter dealing with the determination of characteristic functional groups completely justifies purchase of the edition, yet the entire work is too well coordinated to classify it by chapters of varying degrees of significance.

Dr. Ralph E. Oesper has prepared the English translation, and the description of spot test techniques by Prof. Ph. W. West is again included.

To obtain "Spot Tests", remit \$11 direct to D. Van Nostrand Company, 250 Fourth Avenue, New York 10, N. Y.

Check 2432 opposite last page.

### Fusion Methods in Chemical Microscopy

Reviewed by M. E. RUNNER  
Research Chemist  
Armour Research Foundation  
Illinois Institute of Technology

"Fusion Methods in Chemical Microscopy," by Walter C. McCrone, Jr., should not be overlooked by chemists who are not microscopists. Although written for the chemical microscopist, this inter-

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esting and readable text should prove useful to all analytical and research chemists. Information useful to the metallurgist is here, presented by drawing analogies with organic systems undergoing recrystallization and grain growth during heating below the melting point.

This book of 307 pages is based upon the conviction that the chemical microscopist can solve many identification problems faster and easier than by conventional methods. Much research in fusion methods remains to be done. Still more chemists should be aware of the potential usefulness of the combination of microscope and hot stage.

Author makes a convincing attempt to attract interest in this important field by liberal use of expertly selected photographs. Clarity of presentation is due in great measure to the 118 figures and 19 tables contained in the first 198 pages of text. There are five full pages of color plates showing 14 photomicrographs. In addition, there are 25 figures representing 74 actual photomicrographs in black and white. It would take many words to describe the formation of an eutectic as clearly as do the photographs of Fig 76. This is just one example of the expert photography evidenced by the illustrations.

There are 48 phase diagrams accompanied by photographs of chemical systems. This combination is mutually clarifying, permits greater understanding of the "mixed fusion" system, and at the same time makes the phase diagram meaningful. Techniques, methodology, and instrumentation are thoroughly described. Tricks of-the-trade, known only by an expert in this field, are set down here for the first time in any text.

Last section, a full 100 pages, presents identification tables for 1189 organic compounds. This material, retabulated from the Kofler tables, is now in a more accessible and useful form and represents a valuable source of information to the analytical chemist. Given the melting



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Check 2433 opposite last page.

point of an unknown compound, the melting points of its eutectics with two standard compounds (eight are listed over the range 20 to 340°C), and the refractive index of the melt, it is a simple matter to complete the identification from these tables.

An outstanding achievement of the author and publisher!

To obtain "Fusion Methods in Chemical Microscopy", remit \$6.75 direct to Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Check 2435 opposite last page.

### Project Engineering of Process Plants

Reviewed by D. S. DAVIS  
Head, Department of Pulp and Paper Technology  
University of Alabama

Although courses in plant design appear in nearly every chemical engineering curriculum in this country, no satisfactory text has ever been available. Process plant design is more than hackneyed advice to draftsmen, dreary lists of outdated information about construction, and random, aimless tables of data that are already found in the handbooks.

No one realizes these deficiencies better than Rase, associate professor of chemical engineering at the University of Texas, and his co-author, Barrow, project engineer with the Foster Wheeler Corporation. So now we're confronted with a startling and most welcome innovation: the thoroughly up-to-date "Project Engineering of Process Plants" by two currently active engineers who actually have and still are engaged in designing plants for chemical engineering processes.

Part 1, Major Steps in Plant Design, deals competently with location, underlying data, process engineering, flow sheets, plot plans, scheduling, design, and drafting. Part 2, Business and Legal Procedures, is concerned with procurement, office practice, contracts, and contractors. De-

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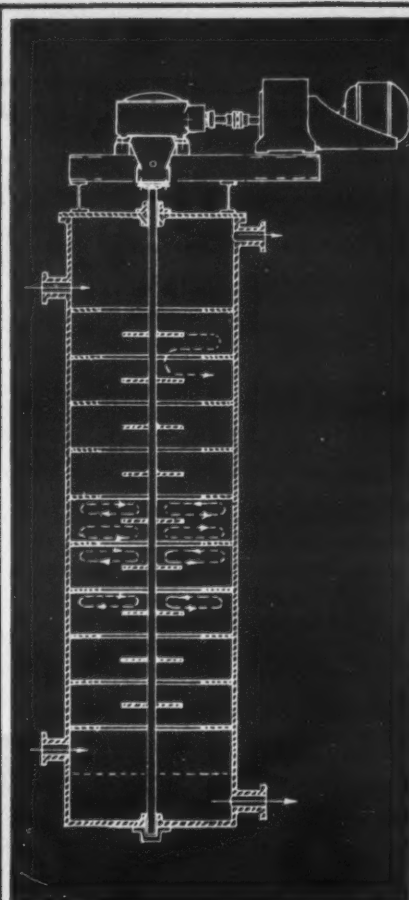


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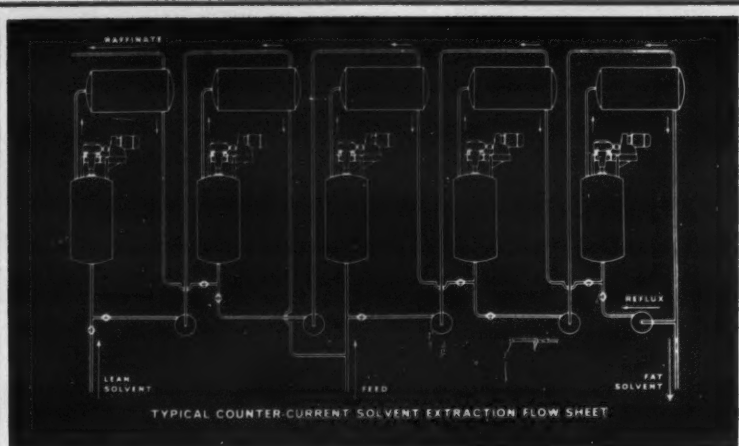
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tails of Engineering Design and Equipment Selection (Part 3) covers equipment, instrumentation, utilities, structures, and safety. Part 4 is devoted exclusively to construction. Throughout, where possible, the treatment is properly quantitative and linked closely with sound concepts of unit operations and unit processes.

In short, Wiley has done it again with line drawings, photographs, new tables, helpful heads and subheads, variations in type size, and a good index — all in 692 pages that do not annoy the reader with show-through. Authors and publisher have actually given design engineers, students, and teachers a modern, well-documented and worthy companion to "Chemical Process Principles" by Hougen, Watson, and Ragatz, and to Burck's "Properties of Petroleum Reservoir Fluids."

To obtain "Project Engineering of Process Plants", remit \$12.25 direct to John Wiley and Sons, 440 Fourth Avenue, New York 16, N. Y.

Check 2436 opposite last page.



"There's the trouble with today's youngsters—they don't drill them enough in basic arithmetic."

Thanks to Tom Blakley, Florida East Coast Fertilizer Co., Homestead, Florida



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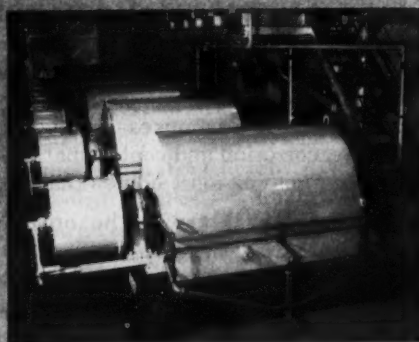
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#### Planning Today for Manpower Tomorrow

The first week in October 1957, marked a milestone in mankind's endless struggle to conquer the elements — man's first tentative step toward outer space. And regardless of the international political implications, the launching of the *Sputniks* — the Soviet satellites — has again pointed up one of our greatest national problems: the supply, disposition, and effectiveness of our scientists.

It's pretty generally accepted that the Soviet moon was first not because the Russian scientist is superior, but because he was able to throw unlimited resources and effort into its development. Yet it's this very situation that causes concern today.

The problem of US science is many-faceted. It's a problem of creating enough future scientists, of getting the most benefit from those in science today. It's a problem of letting the researcher rise to his full height while still working in a competitive society.

In the following three articles dealing with manpower problems, **CHEMICAL PROCESSING** explores some of these facets.

After years of hand-wringing, 'viewing with alarm,' and just talk, the time has come when the impending technical manpower shortage must be solved. So instead of more time and resources wasted on expensive recruitment programs — and even more talk — it's imperative that the industry come up with an over-all plan to assure adequate technical personnel in the future.

To search for such a plan, Victor Chemical recently sponsored its 'Talent Scouts' competition. The entries contain a cross-section of the thinking of the men in the industry and may well suggest ways for us to . . .

## Begin solving the manpower shortage *NOW*

**BILL SCHREMP**

Chemical Business Editor

ANY GATHERING of men from the chemical industry is bound, sooner or later, to bring about talk of manpower shortages. There probably isn't a major chemical producer in the US today who isn't looking — and perhaps has been looking for a long time — for one or ten or a hundred ChEs or EEs or chemists. Vast sums of money are spent every year on elaborate recruiting programs, some of which are effective and some of which are anything but effective.

A great deal of the discussion has become partisan — is there really or is there not a shortage? The battle rages on the pages of the business press, in countless meetings and seminars and conventions, in offices throughout the country. Of course, the question of whether or not a shortage exists now is largely rhetorical — there's a shortage if you need men that you can't find, and there's no shortage if you don't need anyone. But most important, the question tends to cloud the real issue — there will unquestionably be a shortage, and a crippling shortage at that, in the next few years, unless positive preventive steps are taken now.

The solution to the problem is

simple — enroll a few more science and engineering students now, and when the time comes there will be adequate manpower available. According to a recent study made by B. F. Goodrich, scientists and engineers are now being graduated at the rate of 186 out of every 1000 students that earn college first degrees. To meet our basic needs for continued growth and expansion, 205 to 215 out of each 1000 should become scientists or engineers. The problem could, therefore, be solved if just a few more youngsters took up the sciences. Simple?

But is it that simple? A number of things tend to indicate that it's not. First, and not the least important, is the fact that not just every bright youngster will make a good scientist or engineer. The scientific and technical pursuits require a particular sort of mind, a deep curiosity about the physical world; really, a unique personality. By and large, youngsters of this type gravitate into the field of science anyway, leaving only a fringe area to tap for the additional numbers needed. This one fact makes the project of guiding students toward science more difficult.

And although there are a num-

ber of facets of a scientific career which attract youngsters, there are also a number that would tend to discourage them. Few will ever reach the higher income levels — a paradox, because the scientist or engineer is among the highest paid upon leaving school. Only one in ten will ever become part of management. And, for at least some young engineers, there is the inevitable realization that his specific job isn't quite so romantic and exciting after all.

Yet the problem remains. The growth of the population, the industry, the economy points to the irrefutable fact that as the years go by the needs for technical manpower will continue to rise.

And there's little question of the fact that they will be met.

### Where Has Industry Failed?

But how can American industry best help? It now provides



annual scholarships and financial aid worth millions of dollars to schools. It feeds the communications media a never-ending flow of information, well calculated to point the way toward a technical education for youngsters. It aids schools in their guidance programs. What has been overlooked? Where has industry failed to meet the problem of long-range manpower needs head-on. And where, now, can it begin its work to assure a constant supply of trained people?

Not long ago, Victor Chemical Works, at the instigation of President Rothe Weigel, sponsored its "Talent Scouts" competition for programs to combat the long-range shortage. It was concerned with "what can industry do to stimulate the interest of high school graduates in becoming scientists and engineers?"

The accumulated answers to that question, submitted by hundreds of educators, members of the chemical processing industries, as well as members of all industry, represent the thoughts and planning of the men most



concerned. Programs submitted consisted of everything from production and distribution of educational films, to broad public relations programs, from more aid and guidance for teachers, to searching the armed services for potential students. But running through the whole collections of plans were some ever-recurring thoughts: a single, national organization to create and pursue a program for the benefit of all industry; a more effective system of handling scholarships; closer association with the high schools

— not just periodic projects and presentations, but a consistent, long-range effort to help.

Probably no single plan offers a complete solution to the problem. Yet the concept of a single, integrated program of counseling, financial aid, and good student-industry relations can give us the all-important starting point from which to work.

#### Some Proposals

Here, in brief, are some of the highlights from the proposals.

Typical of many plans is the suggestion that industry form a national organization to combat the problem. Thoughts on the subject range from an American Foundation for Science and Engineering Education, to an Industry Student Advisory Council.

The Foundation plan is a particularly ambitious one having two primary functions. The First Division of the group would have the job, mainly to excite and interest young people in the sciences. Suggested projects for the Division include such activities as wide distribution of libraries of scientific books, biographies of prominent scientists, and similar material. Other projects might include publication of a weekly magazine written for the student level.

Further work might be done in such things as distribution of chemistry sets geared to creating interest in the sciences, production and distribution of films and other visual material to schools and other groups. Other projects might be effective in promoting interest among youngsters.

After this first stage has taken effect, the plan's Second Division would become active. The purpose of the Second Division would be to maintain whatever gains were made by the First. Functions would include such things as concern with high school teacher requirements, loans of industry personnel to educational groups, and even arranging bonuses to qualified science teachers to bring their salaries up to industry standards. Other functions of the Second Division would be arranging financial aid for students where it might be needed, and providing counselling services for students.

The Industry Student Advisory Council might take a rather different tack on the problem. Instead of trying to interest students in science as such, the Council would be concerned with the quality of students that went through science curriculums — not screening the students but upgrading them.

#### Financing

These are typical of the plans developed, all-industry in scope, national in operation. But in an operation such as this, there's always a major problem to be



met: financing the organization itself; the administration; the personnel; the printing and publishing costs. But even these formidable costs are minor compared to other suggested expenditures: more financial aid for students; bonuses for teachers; founding of science chairs at universities.

Financing of an over-all plan promises to be something of a problem. Under the current company-by-company system of aid to education, the donor receives more than one value. Besides providing for more students, he receives favorable publicity, he surrounds himself with public good will, he makes friends among universities and students. Any general plan, financed by company subscriptions, might not offer these benefits to the subscribers; hence, might not be accepted too quickly by industry. Yet some financing plan is mandatory if a broad program is to work — and it will probably require more money than is being spent today.

One suggestion meets the problem head-on: raise the 22 percent corporate sur-tax a fraction of one percent. The exact increase should be dictated by the costs of whatever program is decided upon. Resulting funds, earmarked solely for the purpose, could be administered by the National Science Foundation, advised by a committee of the presidents of the major scientific and engineering societies.

And while the thought of raising taxes is sure to be met with raised eyebrows, if not hostility, there is some justification to the scheme. According to the plan's author, "Through the corporate sur-tax approach, the burden for the program would fall only on those companies who can afford to pay, and who are benefiting most from the fruits of modern technology. The cost would not be an expense, but an investment in the future."

Another plan calls for sale of bonds to finance scholarships. An industry-controlled Technical Manpower Foundation might issue the bonds, and from the proceeds make low-interest loans to students. Although the author of the bond-selling plan suggests its use only for financing students, the fund could also support other activities of a national organization.

A great number of the proposals call for more generous scholarships for science students. These would tend to help in two ways. First, they would help those who are actually in need of aid in order to get through school. Second, they would provide an incentive for students to take up science. One of the plans suggests a \$1000 grant to each student registering for a four-year technical course. Such a program for the 120,000 science students enrolled in four-year colleges would cost \$120-million annually. If one percent of the \$16-billion annual net profit of the manufacturing industries were set aside, according to the author, and if such a fund could be declared tax-free, it would more than support the program.

The financing plans all tend to call for pretty bold moves. Tax increases, industry-wide subscriptions, and bond sales are

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# CREATIVITY

## and survival

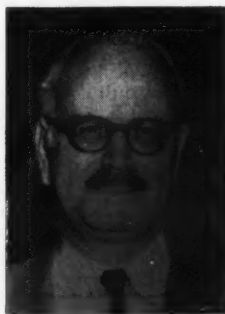
**By Dr. GUSTAV J. MARTIN**  
Vice President and Research Director  
The National Drug Company

It is quite true, that, as a nation, we have done a splendid job technologically. We have made possible the extension to the many, of articles which had once been the luxuries of the few. We have, in the material sense, made an outstanding success. But analysis shows that success, on this basis, has been at the expense of real scientific creativity. Indeed, in light of recent international developments, it may even be at the expense of actual survival!

Examples of what I mean can be adduced from every field of scientific endeavor. In the medical sciences, for example, we are in the era of "wonder drugs." To test the proposition that American science is essentially non-creative, I made a list of fifty of these "wonder drugs" selected at random. I then undertook to determine the country of origin of each material. For this purpose I disregarded analogs and homologs; valuable as these have been, they represent more or less routine work rather than genuine creativity. Sulfanilamide, for instance, was first made in Ger-

many; this is the original molecule from which many others have been derived, and Germany is to be considered its point of origin.

By the time my list was completed I found only one instance and a questionable second in which the "wonder drug" had had its origin in the United



**DR. MARTIN** received his BS in chemistry from the University of Washington in 1932. In 1935 he received his ScD in biochemistry from Johns Hopkins.

He worked in Sprague Institute of Chicago University on brain chemistry, was Professor of Chemistry, College of St. Teresa, 1937. Later he was Research Associate, Trudeau Sanatorium, Professor of Pharmacology, Middlesex University.

From 1939 to 1944, Dr. Martin was Associate Director of Research, Warner Institute for Therapeutic Research, New York City. In 1944 he became Vice President and Research Director of National Drug Company.

States. This is most certainly not due to the comparative youth of the country, since the drugs in question have almost all been created within the last twenty or thirty years.

I was shocked by this finding, and arranged for the preparation of a similar analysis of fundamental new ideas in the world

of physics. The result was the same. Then, in the field of automotive engineering — a field in which one might expect the United States to be dominant — a similar list was prepared. This produced the greatest shock of all; the fundamental new contributions were not of American, but of European origin, and in

general it could be said that American automotive engineering was five to ten years behind the European achievement. It seems pointless to extend the analysis done in support of the conclusion that in the United States, creativity is indeed a scanty commodity.

In fact, one would not be dis-

**THE FOLLOWING ARTICLE MAY SHOCK YOU**  
... and you may disagree completely with Dr. Martin. Yet our scientific accomplishments have recently fallen under severe criticisms and, whether or not these criticisms are justified, the Editors feel that there is much to be gained by discussion of the question.

In any case, Dr. Martin's article certainly provides "food for thought." We print it solely for that reason. And we'd like to know what you — the men on whose shoulders so largely rests the responsibility for the further progress of the nation — think about his viewpoint.

Doubtless there's another side to the picture, and in a forthcoming issue of *CHEMICAL PROCESSING* we plan to present the viewpoints of others. Your thoughts and opinions will help greatly in the preparation and presentation of this future article. Address your comments to The Editor, *CHEMICAL PROCESSING Magazine*, 111 East Delaware Place, Chicago 11, Illinois.

torting the case to state that Dr. Josiah Willard Gibbs, who created the world of thermodynamics, was virtually the one truly creative American scientist. I know that this statement will shock many, but it should. The thought that it is justified certainly shocked me. I am by nature a nationalist and as such would much rather have things appear in a happier light. Nevertheless, they do not, and it becomes necessary to search for causes. There is doubtless more authoritative opinion to be found on these questions — the field is not even defined. Certainly I am not claiming to be an authority, but I do hope to stimulate detailed consideration of the problems which confront American science and the American scientist.

The first step toward correction of the situation is an endeavor to bring into the minds of educators and industrialists a recognition of the problem. The vast majority of such people have an inadequate concept of creativity. They tend to confuse it with minor intellectual exercise and technological developments. The popular press tends to build up the slightest scientific contri-

To page 219

Concern over the technical manpower shortage has brought about many varied suggestions as temporary solutions to the problem. One of these — and it has been uttered only as a slight whisper — is the utilization of post-retirement-age people. In fact, there are many isolated examples of this at this very moment. But — if it should ever become an industry-wide trend, what social and economic implications are involved?

## There's a place for the retired in your cor

GEORGE V. MICHAEL

Assistant Editor

**A**RTHUR GUILLAIDEU, on his way to work in the morning, would not attract any unusual attention. On the surface, he would appear the same as anyone else going to his office. But, if the people on the train knew about him, they might wonder at his presence on that train.

For you see, Arthur Guillaideu, who is retired, continues to work, a thing most people would question his doing. Mr. Guillaideu retired in 1953 after more than forty years in manufacture and research. Over thirty years of this was with one company.

But he did not stay retired. His talents were sought by other Chicago concerns, and, after taking a nine-week "vacation," he was again actively employed. Now, two concerns employ him as consultant on the preparation of technical reports and for allied investigations.

His is just one of the many similar isolated cases that can be found around the country. Many chemical and process companies are employing the services of retired individuals, usually in a consulting capacity.

One who has "retired" because of age, and who yet maintains good health and mental alertness, may be a valuable employee in many ways. He will have seen the effects of changing economic policies — boom times, inflation, depression, war, and peace. He has a store of information built up during years of regular employment. He will have partici-

pated in the growth and changes within industries. He will have kept abreast of the developments in scientific thought, equipment, processes, raw materials, methods of control, etc.

Because of all these, the "retired" worker can be a valuable man at many levels within the responsibilities of new connections. He can review existing records and literature and suggest their significance. He can seek new information for the guidance of management's decisions. He can meet in quite informal fashion with the younger workers and discuss their problems. He can listen to gripes and answer them in ways which will promote good teamwork and better relations.

And — there are specialized jobs which are best filled by those who have accumulated experience. The mature individuals cannot be replaced equally by the less experienced. This very fact itself, points to one not-too-obvious facet of the manpower shortage, and that is, the availability of specialized jobs not easily filled by younger people.

This is emphasized in Mr. Guillaideu's case. His forty-some years in industrial fields have given him experience not easily matched in a younger man. Also an ability to translate technical papers from several foreign languages contributes to his value as a consultant.

In a survey\* conducted by the Life Extension Foundation, it was

learned that 25 percent of retired individuals take either part- or full-time jobs after retirement. Of these, apparently 74 percent do it to supplement their retirement incomes.

So these jobs do exist. And in quantity, if we are to believe the above figures.

What has made such people available for these jobs? It is the strict policies of companies that call for retirement at 65. Under these rules, the companies are unable to keep valuable employees on the job. And the shortage of experienced people to fill these specialized jobs isn't acute enough to call for any immediate industry-wide action effecting a change in retirement policies.

This was quite evident in a recent CHEMICAL PROCESSING survey covering twenty-eight major chemical companies, where the companies unanimously answered that their retirement policies call for compulsory or normal retirement of technical people at 65. They also stated that no changes in policies are being contemplated. And, in all cases, there was no distinction between technical and other salaried people — in all capacities including management. (Generally, the policies called for an earlier retirement of women.)

Those companies that gave any thought to holding retired people

on their jobs indicated that this is possible only under rare circumstances. And, for these individual cases, much red tape is involved. Ten percent of these reporting, definitely limit the past-sixty-five work period to one year. Another ten percent put their limit at an age of 68. Twenty-five percent will keep

### ANY COMMENTS?

Perhaps you have some thoughts on compulsory retirement. If so, we would like very much to hear them. We know others will be interested in your comments, and we shall publish suitable letters in the "Letters from Readers" column (page 12 this issue). Please address your remarks to:

John C. Vaaler  
Editor  
CHEMICAL PROCESSING  
111 E. Delaware Pl.  
Chicago 11, Ill.

the employee until he reaches 70, but here again it indeed must be a rare case!

Several companies stated that they are using retired individuals on a consulting basis. One company stated that their Board of Directors has requested to keep the president and board chairman (but no others) for a few years beyond 65.

Consequently these companies with their strict retirement programs as part of their employment policies must, if they want to hire someone past 65, employ them on either a part-time or a consulting basis. This is probably how it would continue if these needs increase. There would be

\*U. S. News and World Report, Feb. 1, 1957.

For Arthur Gullaudeu,  
a "new" life began at 65 . . .



. . . when his services as a consultant on preparation of technical reports were happily received by several Chicago firms



For the past four years, this work has given him the opportunity to meet new people, learn new things . . .



. . . and pursue a life-time interest by applying active and productive talents and by utilizing a wealth of experience gained over the years

## our company

no changes in retirement policies for people who are on a regular employment basis.

But some rather strong opinions — both pro and con — have been voiced on the idea of retired people working.

Those opposed to the idea ask, "Why, with the advent of retirement plans and old age benefits, should retired people work?" Instead they call for a special effort to train younger people to fill these vacancies. They point out that retirement is one way to keep "new blood" pouring into the company.

In this modern day, "retirement" has become a household word. Where, some years ago, retirement was possible to only a privileged few, today it is the realization of almost everyone employed by a good-size company. Liberal retirement programs and policies are a major talking point in recruitment. Certainly in today's rush to grab up the budding engineers and scientists fresh out of school, the idea of an early and fruitful retirement has attracted many.

But due to modern medicine, less strenuous working conditions, and a definite emphasis on leisure, we are living longer than our counterparts of twenty-five years ago. According to the figures, a man at 65 has many productive years ahead of him. US Census Bureau figures now put present life expectancy at 78 years. And it's increasing — life

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**DR. HALDON A. LEEDY** has spent his entire professional life in helping Armour Research Foundation grow to its present position of eminence in the field of science and technology. As vice president and director, he is responsible for about \$14 million in annual sponsored research for more than 700 industrial firms and government agencies.

Dr. Leedy joined ARF as a physicist in 1938. In 1944, he was advanced to chairman of the physics research department, assuming the Foundation directorship two years later. He was named vice president in 1950.

A native of Fremont, Ohio, Dr. Leedy received his BA degree in physics in 1933 from North Central College, Naperville, Ill., and was awarded the MA and PhD degrees from the University of Illinois in 1935 and 1938, respectively. He is active in numerous professional and civic organizations. Dr. Leedy resides in La Grange, Illinois, with his wife and three children.



**In the competitive world of today, companies of all types and sizes must take advantage of technological developments if they are to prosper and grow. With costs continually on the upswing, how can small firms with limited research budgets afford the 'luxury' of modern research facilities? The answer may lie in . . .**

## COOPERATIVE RESEARCH boon to limited budgets

### **DR. HALDON A. LEEDY**

Vice President and Director  
Armour Research Foundation of  
Illinois Institute of Technology  
Chicago, Illinois

**"WE CANNOT AFFORD to do research."**

There was a time not too long ago when such a statement was common and perhaps true. It certainly isn't today. In fact, you are more likely to hear:

**"We cannot afford not to do research!"**

This reversal of attitude has been brought about by various factors, each doing its part to make research and development a necessity rather than a luxury. More and more industrial firms are recognizing that their future depends, to an ever-increasing extent, on the results of research and development. To do otherwise would be to commit economic suicide.

It is possible today for most companies to have access to the best scientific and engineering talent and equipment at a rela-

tively small investment. A company no longer must do a multi-million-dollar business or have its own laboratories to conduct research and development.

One of the most economical ways that this can be done is by "cooperative" research. This consists of two or more firms banding together in a research undertaking of mutual interest. By pooling their information, funds, and perhaps some of their research personnel, chances of success are greater, while cost to the individual participating firms

◀ The team approach in cooperative research results in greater chances of success at minimum cost to the individual participating firms

are kept to a minimum.

The actual research work can be carried on in the laboratories of companies, trade associations, outside research organizations, and colleges and universities.

#### How Cooperative Research is Conducted

Here are the three principal ways in which cooperative research is conducted:

1) A company works out a research program with one or more of its suppliers of equipment and materials.

2) Two or more companies — perhaps even competitors — join together to solve certain problems of mutual interest.

3) A cooperative organization, such as a trade association, is utilized to direct research of benefit to all or part of its membership.

The first arrangement (supplier-customer) occurs when a problem falls into a supplier's area of specialization. Not all suppliers, of course, are willing to cooperate on this basis, especially if the account is small or the problem large. However, if the dealings represent a substantial portion of his business, the chances of some form of cooperative research are excellent.

For example, a cannery might use this method to get cans to meet specific needs, while an electric motor manufacturer might take advantage of the supplier-customer relationship to obtain improved high-voltage insulation.

In the second arrangement, where two or more competing companies are involved, the participating firms generally have failed to tackle or solve the problem individually. The problem in such instances usually has little or no competitive importance, or is of such magnitude that the companies are willing to sacrifice the competitive advantage for its solution.

The third arrangement for cooperative research — through a formal cooperative organization — is the most common. There

are now more than 5000 such cooperative organizations in the United States.

#### More Cooperative Research Ahead

A special survey sponsored recently by the National Science Foundation revealed that 531 cooperative organizations — about one out of five answering the questionnaire — spent \$20.4 million for technical research and development in 1953, and that the volume was expected to increase to \$26 million by 1958.

Average expenditure came to \$38,500. Expenditures ranged from less than \$100 to nearly \$1.7 million.

First research expenditures by a cooperative group, according to the survey, dates back to 1895, when the Hawaiian Sugar Planters Association launched such a program. Other pioneering organizations are the Malleable Founders Society, 1897; American Society of Testing Materials, 1904; American Concrete Pipe Association, 1907; National Paint, Varnish and Lacquer Association, 1907; and American Society of Mechanical Engineers, 1909.

Two reasons were generally cited in the survey for not supporting a cooperative research program:

1) High cost of initiating such a program, particularly the equipping and staffing of a laboratory.

2) Performance by other agencies of research applicable to the interests of the organization.

These objectives are overcome in part by the record of cooperative organizations that are sponsoring technical research and development programs. The survey showed, for example, that over \$8.4 million of the \$20.4 million spent on research and development in 1953 did not require laboratory facilities owned and maintained by the organizations. Much of this research was carried on in college and university laboratories and at independent research institutes.

#### Trade Associations Lead the Way

As would be expected, trade associations sponsored the bulk

of cooperative research and development. The survey revealed that 383 of the 531 groups reporting research expenditures were trade associations, and that their combined expenditures accounted for \$12.5 million of the total \$20.4 million. Trade-association research usually is administered directly through the association. However, sometimes a separate research affiliate is set up for this purpose.

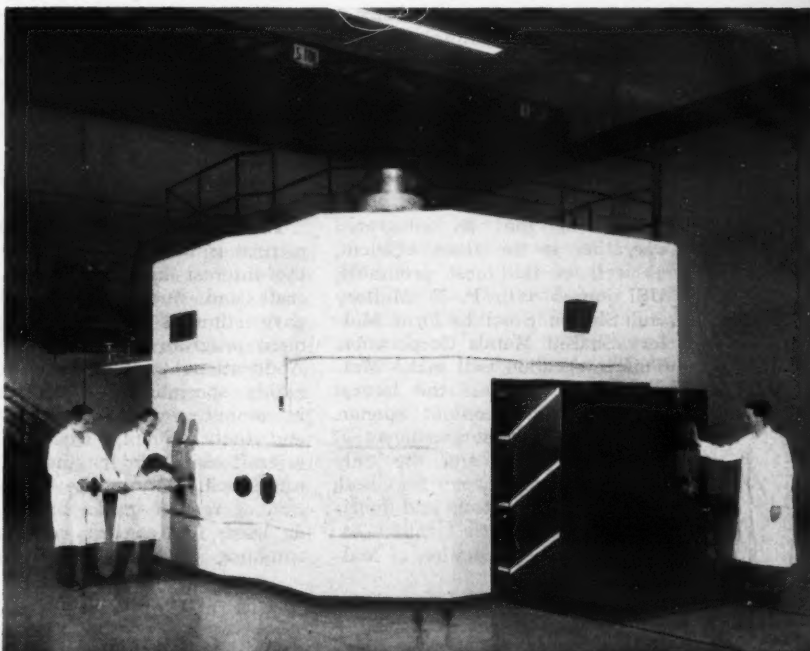
Independent research organizations like Armour Research Foundation have conducted research and development for all types of cooperative groups. Recently, ARF made a valuable contribution to the steel industry in a project sponsored by the American Iron and Steel Institute. An economical domestic substitute for palm oil was developed for use as a lubricant in the cold rolling of steel. It is estimated that the steel industry will save a half-million dollars or more a year because of this development.

In another case, an improved clutch for an office machine was developed for less than \$10,000. A new jet engine component resulted from a \$20,000 research program. Still another was a food product that was turned up for a cereal company in a \$15,000 project.

Currently, we are carrying on

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Typical of the unusual facilities available to cooperative groups at independent research organizations is this nuclear reactor at Armour Research Foundation



Ti  
Zr  
Hf

U. S. Industrial Chemicals Corporation, Division of National Distillers and Chemical Corp., recently joined with P. R. Mallory & Co., and Sharon Steel to form Mallory-Sharon Metals Corp. This integrated operation will make Mallory-Sharon the largest producer of Zirconium sponge, one of the largest producers of titanium sponge, and the only integrated producer with fabricating facilities for both metals. Years of market research and planning went into making this decision. Here, the top USI official cites some of the important points that went into the study.

## Today's 'Wonder' Metals — — How They'll Look Tomorrow

### DR. ROBERT E. HULSE

Executive Vice President  
National Distillers Products Corp.

USI's entry into the titanium and zirconium fields was a logical extension of its metals program. The Cincinnati Research Division of National Distillers had developed a new, commercially adaptable process for the manufacture of zirconium and titanium sponge, which not only gave a higher purity sponge, but represented a considerable cost reduction over the conventional Kroll magnesium reduction method. The new method uses liquid sodium to reduce titanium or zirconium tetrachloride — and USI's sodium-chlorine plant at Ashtabula, Ohio, presented a logical and economical source of raw materials.

Believing that an integrated operation is the most efficient, as well as the most profitable, USI joined with P. R. Mallory and Sharon Steel to form Mallory-Sharon Metals Corporation. This integration will make Mallory-Sharon Metals the largest producer of zirconium sponge, one of the largest producers of titanium sponge and the only integrated producer for both metals, with melting and fabricating facilities.

Prior to the formation of Mal-

lory-Sharon Metals, we were completing a 2-million-pound-per-year zirconium sponge Plant with half its production committed to the Atomic Energy Commission. Decision to expand into the titanium sponge production was brought about by the commercial feasibility of the sodium reduction process plus the market potentials for the metal in both government and civilian areas. The 10-million-pound-per-year titanium sponge plant, soon to go on stream, made USI the first company to enter the titanium field without a government procurement guarantee. Under the integration, Mallory-Sharon Metals will acquire complete ownership of all USI titanium and zirconium production facilities.

### Extended Outlook Favorable

This is the extended market picture as we see it: It has been the interest in high-speed aircraft and nuclear power that gave stimulus to the development program for these metals. Applications to date have been highly specialized — zirconium in atomic reactor construction and fuel elements, titanium in aircraft skins and engines. Hafnium, extracted in the production of reactor-grade zirconium, is used for control rods and shielding applications in nuclear

reactors.

Despite the recent aircraft cut-backs, which reflect directly on the titanium market, and limited present-day commercial markets for both titanium and zirconium, the long-range outlook presents a favorable picture. This is to say that the future of titanium, zirconium and the other "reactive" metals is by no means limited to these specialized fields. While new uses in the aircraft and nuclear industries will be developed, and those industries will continue as the most important outlets, the next decade will definitely find these materials in a myriad of applications — some yet to be investigated; some yet undreamed.

Indeed, there is a growing realization of the metals' potentialities, in non-nuclear and non-aircraft applications, and this has spurred research for their use in commercial and industrial installations.

Increased production and know-how, and new alloy developments, stimulated by nuclear and jet demand, have resulted in greater material availability for commercial markets. Fabrication techniques continue to improve; costs of production and material are lowered; interest increases; and applications, heretofore unrealistic, become feasible and economical.

### Application vs Cost

Potential markets depend on material costs. To date, cost of material, from sponge to fabricated product, has remained above the realm of interest to the average potential user, but both titanium and zirconium can offer indisputable economic benefits in specific applications, tailor-made to exploit their specific properties. Integrated operations such as Mallory-Sharon Metals will provide the means for placing fabricated mill products on the market at reasonable costs. For example, waste encountered in milling can be reworked, resulting in substantial savings.

Rapid expansion, quest for leadership in developing new applications, and over-produced markets such as now exist in the titanium industry, will continue to influence the steady and rapid price descent which has recently marked the reactive-metals industry. In 1952, the price of zirconium sponge was \$20 per pound, and now, just five years later, that price has been cut 75 percent. In like manner, it is entirely plausible to forecast a price for titanium sponge of around \$1.50 per pound by 1962 if sufficient volume develops.

The speed with which these metals are adopted in equipment



**DR. HULSE** received his BS and MS from Rutgers and took his PhD from Cornell University. He started his career with Du Pont where he ultimately became a plant manager. He joined National Distillers in 1949 as Director of Research and Development. He became Executive Vice President of the company earlier this year.

Besides his duties as Executive VP, he is also a Director of the company and General Manager of the US Industrial Chemicals Division. He serves as VP and Director of National Petro-Chemicals Corporation and is a Director of the newly formed Mallory-Sharon Metals Corporation.



design is principally dependent on the rapidity with which designers and plant engineers acquaint themselves with their properties and design characteristics, and relate them to existing problems. Reduced maintenance costs and drastically reduced downtime due to longer equipment service-life, rather than high initial cost, will eventually be the deciding factor in most cases.

Zirconium offers excellent resistance to a variety of strong acids and alkalis including that perennial problem-child, hydrochloric acid. Titanium's resistance to pitting from materials such as ferrous chloride, cupric chloride, and hypochloride, is unequaled by any other moderately priced metal. Titanium is also resistant to contact- or crevice-corrosion, making it ideally suited for chemical equipment where frequent cleaning is impossible.

Structural materials are judged on a cost versus performance basis. Therefore, when the cost of a finished fabricated zirconium part, such as valve seats and stems, is only 100 to 300 percent above that of stainless steel, and yet the performance and service life is 300 to 500 percent above that of stainless steel, the initial cost, pro-rated over the lifetime of the part, is easily justified on continuity of operation.

Currently, mill products fabricated of titanium are priced at 8 to \$14 per pound, with zirconium materials approximately \$5 higher. Hafnium sponge is selling for \$25 per pound, making the cost of a fabricated mill product prohibitive, except for reactor applications, at least for the present time.

However, the cost of hafnium might eventually become economically reasonable should an Australian process for separating the metal from zirconium chloride prove commercially sound. In the event that it does, only reactor grade (hafnium-free) zirconium sponge would be produced, thus increasing the volume of hafnium available to industry and subsequently resulting in a substantial price decrease.

#### Markets Varied

Thus, if we balance cost considerations with the unique properties which each of these metals offer, we can say the following: The future market for titanium and its alloys will be based on its high strength, low weight, and exceptional corrosion resistance. Titanium alloys have strength properties close to that of alloyed steel but its weight is only 60 percent that of steel. For this reason we can count among ti-

tanium's potential applications any equipment designed to be carried by man or in the air. This includes tools, rifles, even airborne tanks and artillery.

Presently, it would appear that marine applications will be one forerunner for the commercial titanium market with airborne equipment and the petroleum and chemical industries following in close order. Salt water piping systems, pumps, propellers and propeller shafts, pontoons, and any other shipboard applications where equipment is actually exposed to salt water, will be "naturals" for titanium construction. The Office of Naval Research at Kure Beach, North Carolina, has tested marine equipment fabricated of titanium over an eight-year period, and has found the material to be completely impervious to corrosion and deterioration by salt water.

Current costs are prohibitive, but it is not beyond the realm of possibility to envision the day when an entire ship hull will be fabricated of titanium. Because of the exceptional resistance of the metal to salt water corrosion, hulls made of titanium would require no painting during the lifetime of the ship and would last indefinitely. This means that outside normal downtime for general servicing and parts replacement, the vessel would be

in service 90-95 percent of its lifetime, 20% more than the present average.

New uses for titanium include the petroleum industry where titanium piping will be used to handle high-sulfur crudes. In the textile industry, high-speed spindles have already proved superior to formerly used materials, with many applications yet to come. For the future, we can safely forecast titanium in increasing use for such products as lining for autoclaves, anodizing racks, filter presses, heat exchanger tube bundles and lithographic plate materials.

Zirconium offers many interesting possibilities in commercial and industrial applications. There is a strong possibility that it can and will replace the costly and heavy tantalum now being used in surgical equipment. Zirconium is ideally suited to surgical use because of its resistance to attack or discoloration by mercury salts, iodine or high-temperature sterilization. Surgical pins and plates fashioned of zirconium have been shown to be unaffected by body fluids. Tissue grows directly on the metal with no sign of deterioration or decay. Zirconium has already been used successfully in the fashioning of artificial eyes, and finely rolled zirconium sheets are being tested as artificial lung spacers.

*To next page*

## Wonder Metals

From preceding page

Zirconium's low vapor-pressure and high boiling-point coupled with its non-volatility make it ideal as a "getter" — an absorber of gaseous residues in vacuum tubes. Oxygen and nitrogen are absorbed in solid solution, leaving the metallic surface free to accept additional gas.

A recently developed lamp, which might well revolutionize some of the techniques of motion-picture and television projection, uses zirconium as its light source, and the resultant brilliance rivals that of the sun.

Researchers are currently studying means of controlling the chemical activity of zirconium — once controlled it would have wide application as a cleanser in metallurgical processes. The industrial value of zirconium alloys is immeasurable. Zirconium boride can withstand temperatures up to 6000°F. Alloyed with gold, it has formed the hardest gold-base contact alloy known.

Hafnium's present cost makes it prohibitive for other than nuclear applications. Fabricated products would probably be in excess of \$50 per pound, placing it beyond the realm of commercial acceptance.

### Demand Versus Production

To date, the entire titanium industry has been supported by the government procurement program. Recent cut-backs in Defense Department spending, with additional curtailment forecast for the future, indicate a rather unfavorable short-term future. The industry's rapid growth has been directly attributable to military applications, and many suppliers, content to produce on direct contract for the government, have not emphasized their research programs directed toward industrial and commercial application of titanium metal.

Integrated programs for sponge production, as well as fabricated mill products, will force producers into keener competition for civilian and government markets and will improve the technological know-how for the industry.

# Farris

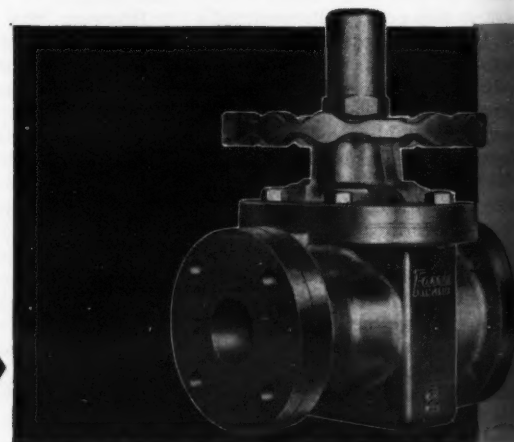


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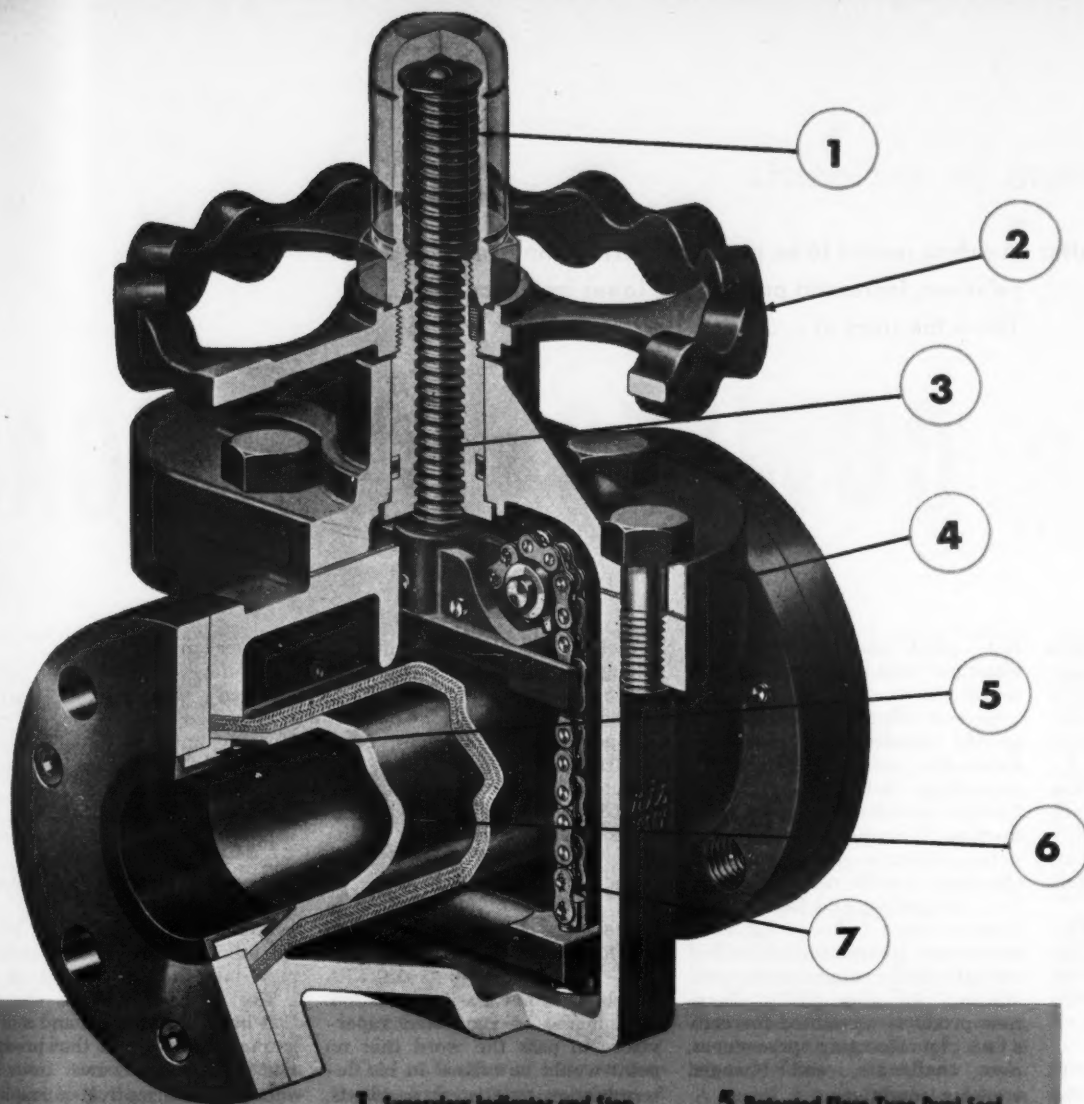
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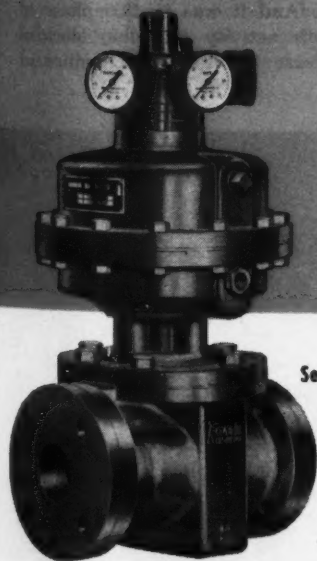
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At present, the titanium market is over-produced. Stock piles are mounting daily. The 1956 production of sponge was 29 million pounds with only 22 million consumed. Titanium mill production for the same year totaled 10,600,000 pounds; 1957 production will probably range between 12 and 14 million pounds, despite earlier estimates of a 100 percent increase over 1956.

Despite these shadows, the uses of titanium are expected to increase so rapidly that supply and demand will be balanced in 2 to 5 years.

The zirconium market is also closely allied to the government's efforts, but, for the present, production has not equaled demand and great potential does exist for commercial applications in privately owned atomic installations, as well as in corrosion-resistant equipment for the chemical and allied industries.

Government procurement programs have supported the high prices of the materials, but with the introduction of new and improved purification and reduction processes, and most especially U.S.I.'s semi-continuous sodium reduction process, prices have shown a steady drop. Our company's recently quoted price of \$4.54 per pound to the AEC on large quantities of reactor grade zirconium sponge, is the lowest on record. This presents a striking contrast to the \$100-per-pound-price which the material commanded just 25 years ago.

Zirconium and titanium, as well as the other reactive metals, hold great promise for the future. As producers become less dependent on government contracts, commercial applications will increase. Price cuts will continue to influence the general market picture.

There may be some imbalance in the market for these metals for a few years, but there is no question about the eventual outlook with zirconium, hafnium, niobium, and beryllium demand already exceeding supply. The only real question in the reactive metals field is whether it will take two years, or three years, or as long as four or five years before titanium fulfills its promise. ■

Check 2439 opposite last page.



## Management team vs. accidents

**Results:** A safety record to be proud of, better employee relations, increased production, lower insurance rates. This is the story at . . .

# COWLES CHEMICAL

**F**OUR years ago, Cowles Chemical Company's management team, headed by President Robert Huntley, launched a war against accidents. As a result, the Skaneateles Falls, N. Y., plant, which, at that time, was heavily plagued with accidents, now flies The National Safety Council's green cross. The plant completed 1956 with only one lost-time mishap.

This is in sharp contrast with New Year's, 1953, when the plant's annual accident rate stood at 18 times that of all industry and 42 times the average for all chemical manufacturing.

Other Cowles plants, too, can be proud of their records — the Lockport, N.Y., plant recently completed 871 days without lost-time accidents, and the Sewaren,

N.J., plant has had only two lost-time accidents in the last seven years.

Several things had contributed to the incidence of accidents. First, like others in the fast-expanding field of chemicals, Cowles periodically started production of completely new products. Silicates and cleaning chemicals for the metal finishing, food processing, and laundry industries were followed by vitamins for pharmaceuticals and animal feed supplements, and silicones for glass fibers. These new products accounted for constantly changing procedures, new challenges, and changed working conditions.

Second, with diversification, had come growth — from a total of 48 employees at the Ska-

neateles Falls plant to some 120. Along with manufacturing operations, construction projects increased the number of personnel actually in the plant, complicating normal procedures, and increasing potential hazards. "Hard luck" mishaps too often were slowing production, boosting costs, and undermining morale.

In the firm's home office in Cleveland, President Huntley concluded that systematized efforts would have to begin with himself and his line organization. In a memo he requested supervisors to pass the word that no point would be missed in his determination to control accidents. Everyone down to the last line employee was to be sold on the idea that safety — in every way,

for everyone — pays off.

A safety engineer for a newly engaged compensation carrier was called in to confer with Huntley and his staff. Together, they made a complete analysis of the situation.

It was found that some 60 percent of the employees were exposed to possible eye injury, or serious tripping or slipping hazards. At least half were exposed to possible chemical burns or other injury from handling materials.

The intensified drive was on. It had always been, and still is, management's belief that production efficiency comes from an educated and motivated employee. And it was in this phase of their activity that they decided to use the safety techniques of

### KEY STEPS in the Cowles' safety program

Cowles' President Robert Huntley (left), in behalf of his company, receives plaque from William Douque, Syracuse, N. Y., Employers Mutuals of Wausau, Manager. Plaque is in recognition of Cowles safety record (262,000 man-hours, 18 months, 1 lost-time accident), a result of good management-employee relations in a safety program maintained through . . .



. . . an alert and vigorous safety committee . . .

# Where Management Sells Safety

companies much larger than themselves, refuting the oft-expressed opinion that "small companies can't afford to use such methods."

Based on this idea, practical techniques of communications from management to employee began, and continue to be used fully. Some of the major highlights of Cowles' accident prevention activities within the past few years include:

## • The Safety Committee

This group, made up of both supervisors and production employees, advises in all matters pertaining to accident prevention. Committee members keep a watchful eye on all operations and have contributed valuable

suggestions to Cowles' safety program.

## • Periodic Meetings of All Employees

Meetings with all employees in the plant are conducted by Norm Woonton, Vice President-Manufacturing, or the plant superintendent, John Bates, who reaffirm management's interest and concern. Films and talks, by the insurance company that helped set up the program, supplement the education sessions.

## • Incentives

There are drawings for savings bonds, and recognition given at plant-wide meetings for contest-winning employees. Awards are presented in the presence of all

the officers of the Cowles company.

## • Personal Contact

Letters to employees' homes are used to point up management's interest, to congratulate employees when there is a reason, and generally to build interest in the plant's progress.

## • In-plant Communications

The bulletin board is used effectively to keep people informed. Besides safety posters, there are also contest notes, memos from management, and a clear definition of future goals. A novel sign is used to take a positive approach to safety. It supplements another sign by showing the number of days left

(each day) for the next goal.

All this has added up to good safety management — by management.

The results? There are many.

Perhaps the most significant is better employee relations. There is less production loss due to injuries. Insurance rates have been greatly reduced. In its worst years, Cowles' compensation insurance cost \$1 per \$100-of-payroll more than the average for all chemical firms. Since July 1, 1957, they are paying 15 percent less than the average.

(Counsel and recommendations on setting up accident control programs may be obtained from Employers Mutuals of Wausau, Department of Information Services, Wausau, Wis.)

Check 2440 opposite last page.



... stimulation from meetings of all employees ...



... effective in-plant communications ...



... and well thought-out incentives.

As economic barriers are being lowered, dramatic developments are taking place. Let's take a close look at what's new in —

Dr. A. M. Gammill (left) and E. E. Klicker examine small pieces cut from "heavy" rare earth metal ingots

Other employment was with the Oak Ridge National Laboratory and the Illinois Water Treatment Company.

He holds a BS degree from the University of Illinois, and an MS degree and PhD from the University of Wisconsin. He is a Member of the American Chemical Society, the American Nuclear Society, and the American Institute of Mining, Metallurgical, and Petroleum Engineers.

Prior to joining Michigan Chemical Corporation, he was associated six years with International Minerals & Chemical Corporation, and a short time with Pennsalt Chemicals Corporation in market research, product and commercial development capacities.

Mr. Klicker is a graduate chemical engineer and also holds a degree in business administration. He is a Member of the American Chemical Society, Chemical Market Research Association, American Ceramic Society, and the American Institute of Mining, Metallurgical, and Petroleum Engineers.

# HEAVY' RARE EARTHS

**HEAVY' RARE EARTH**

**husky youngsters of the atomic age**

The image shows a periodic table of elements. The title "HEAVY' RARE EARTH" is written in large, bold, black letters across the middle of the table. Below the title, the subtitle "husky youngsters of the atomic age" is written in a smaller, bold, black font. The periodic table includes elements from Hydrogen (H) to Oganesson (Og). The elements are arranged in groups and periods. The title and subtitle are centered over the middle of the table, covering elements from Lithium (Li) to Barium (Ba).

Based on "Fundamental Chemistry," 2nd Ed., by H. G. Deming. John Wiley & Sons, Inc. Courtesy of Merck & Co., Inc.

**DR. ADRIAN M. GAMMILL**, Director  
Rare Earths and Thorium Division  
Michigan Chemical Corporation  
St. Louis, Michigan

Even the least abundant — thulium is only about as “rare” as cadmium, gold, platinum, or silver.

**Why then are rare earths rare?**  
It's not because they are not abundant. Probably they are thought to be rare because they are hard to purify.

The "heavy earths", samarium (62) through lutetium (71) and their sister element yttrium (number 39), which is chemically similar and is always found

The "light" rare earths were the first of the series to capture the commercial limelight. Their "heavier" brethren are now telling them to "move over." Let's take a look at the reasons why.

Ion-exchange separation gives "heavy" rare earths (elements 62 to 71 and 39) with purities up to 99.9+%. This high-purity production of the "heavy" rare earth elements has aroused great interest and is the segment of the rare earth industry where dramatic developments are expected. Although the factor behind the development of this industry has been the atomic energy field, many other industries are looking at rare earths with a gleam in their eye.



## Nucleonics

Several elements or materials are being used or are being investigated as control rods (neutron-absorbing rods to control the rate of fission) in nuclear reactors and as neutron shields (these shields absorbing neutrons that ordinarily would pass through the reactor housing) around nuclear reactors. These include boron and boron-10 (the isotope 10 of boron), hafnium, indium-silver alloys, cadmium, and the rare earth elements samarium, europium, gadolinium and dysprosium. Table I shows the thermal neutron cross-sections of these elements as well as the values for all the "heavy" rare earth elements.

The "heavy" rare earth ele-

TABLE II  
Physical Properties of "Heavy" Rare Earth Metals

Element	Melting Point °C	Estimated Boiling Point °K	Density gm/cc	Crystal Form (room temp)	Estimated Heat of Vap. K-cal/mole	Estimated Heat of Fusion K-cal/mole
Lutetium	1650-1750	2200	9.849	cph*	59	4.6
Thulium	1550-1650	2400	9.318	cph	56	4.4
Yttrium	1552	3300	4.472	cph	80	4.1
Erbium	1500-1550	2900	9.058	cph	70	4.1
Terbium	1400-1500	2800	8.253	cph	70	3.9
Holmium	1500	2600	8.799	cph	67	4.1
Dysprosium	1400	2600	8.565	cph	67	4.1
Gadolinium	1350	3000	7.868	cph	72	3.7

Metals above this point are considered high-melting

Samarium	1052	1900	7.540	rhombohedral	46	2.6
Europium	900	1700	5.166	bcc	40	2.3
Ytterbium	824	1800	6.959	fcc	40	2.2

TABLE I  
Thermal Neutron Absorption Cross-sections of Common Control Materials and "Heavy" Rare Earths

Elements	Atomic Number	Absorption Cross-section (barns)
Boron	5	750 ± 10
Yttrium	39	1.38 ± .14
Silver	47	60 ± 3
Cadmium	48	2400 ± 200
Indium	49	190 ± 10
Samarium	62	5500 ± 200
Europium	63	4600 ± 400
Gadolinium	64	46,000 ± 2000
Terbium	65	44 ± 4
Dysprosium	66	1100 ± 150
Holmium	67	64 ± 3
Erbium	68	166 ± 16
Thulium	69	118 ± 6
Ytterbium	70	36 ± 4
Lutetium	71	108 ± 5
Hafnium	72	115 ± 15

(Isotopes of high cross-section rare earths)

Samarium — 149	50,000 ± 20,000
Europium — 151	9000 ± 3000
Europium — 152	5500 ± 1500
Europium — 153	420 ± 100
Europium — 154	1500 ± 400
Europium — 155	14,000 ± 4000
Gadolinium — 155	70,000 ± 20,000
Gadolinium — 157	160,000 ± 60,000

Sources: Technical Information Service US Atomic Energy Commission No. AECD-3647 (The Reactor Handbook Vol. 3-Sec. 1)  
No. BNL-325

\*cph — close packed hexagonal  
fcc — face-centered cubic  
bcc — body-centered cubic

Source: Best estimates and "The Preparation and Properties of Rare Earth Metals" by F. H. Spedding and A. H. Daane, "Progress in Nuclear Energy," Vol. I Series V (1956), Pergamon Press

ments, by themselves, encompass a wide range of nuclear properties. For example, gadolinium has the highest thermal neutron cross-section of any known element and, therefore, has a high degree of "blackness" to neutrons with thermal energies. Another "heavy" rare earth, yttrium, has a low thermal neutron cross-section.

A high thermal neutron cross-section means that the element has the ability to absorb and capture neutrons, in other words, it has a high opacity to neutrons. Conversely, a low thermal neutron cross-section means that neutrons can pass readily through the material. In other words, the element has a high transparency to neutrons.

From Table I, the neutron absorption cross-section of gadolinium is 46,000 ± 2000 barns. Yttrium has a cross-section of 1.38 ± 0.14 barns.

In addition to gadolinium, others of the series that have high thermal neutron cross-sections are samarium with a cross-section of 5500 ± 200 barns, and europium with one of 4600 ± 400 barns.

The nuclear properties of rare

earths will interest nuclear engineers. Ideally, the nuclear engineer would like his control rod material to have the following characteristics: (1) relatively high cross-sections to thermal (low energy), epithermal (intermediate energy) and fast (high energy) neutrons; (2) the neutron absorbing element in the control rod should, upon absorbing neutrons, decay into a daughter product with a relatively high cross-section; (3) it should withstand high temperatures since the higher the temperature at which a reactor can operate, the higher its thermal efficiency will be; (4) it must be workable so it can be fabricated into the desired geometric shapes; and (5) it must suffer very little radiation damage. These factors will all be considered along with cost and availability of each control material.

Boron and cadmium received most of the attention as neutron absorbers in the early days of the atomic energy industry because they were available or, in the case of boron-10, could be made available. However, boron and boron-10 suffer greatly from radiation damage and

the cost of boron-10 will always be high since it must be separated from naturally occurring boron compounds by a complex electromagnetic equipment (calutron). Cadmium has a relatively low melting point and therefore has limited application in power reactors. Hafnium has been available in modest quantities for several years as a by-product of the government's zirconium program. However, it has a relatively low thermal neutron cross-section, which means that a much greater quantity will have to be used to achieve the same degree of "blackness". Otherwise, it is a control material of great interest with long life.

The "heavy" rare earth elements have only been available in semi-commercial and commercial quantities for two to three years. However, a great deal of information has been developed on the rare earth elements as control rod and shielding materials, during this short period. The rare earth elements may be used as control rod materials in three ways: (1) as cermet control rods made by dispersing a rare earth oxide in a metal matrix (oxide dispersions approaching 40% composition have been made with certain rare earth oxides such as gadolinium oxide in stainless steel and titanium that may be fabricated into various shapes by extrusion methods); (2) as metallic control rods made by alloying the rare earth metals with a matrix metal such as stainless steel; and (3) as solutions where a water solution of a rare earth salt such as nitrates or sulfates is passed through tubes in the reactor core.

Considerable work has been done in developing cermet-type control rods largely because of the unavailability of rare earth metals. With gadolinium and other rare earth metals being available, increased developments of their alloys will be made. High-purity rare earth metals and alloys can be worked or otherwise fabricated into desired shapes by more or less standard metallurgical techniques.

These rare earth neutron absorbers are fabricated into strips, rods, or slabs which must have

good mechanical properties, corrosion resistance, good physical stability, and good resistance to radiation damage.

As additional information is developed on alloy systems of the rare earth metals, it is believed that the metallic form of the rare earth elements will assume a more dominant place as the neutron absorbers in control rods and shielding. Use of rare earth metals such as gadolinium with other control materials such as hafnium has been suggested and may have great merit in nu-

clear control application. Europium has four daughter isotopes which will absorb neutrons. Therefore, one europium atom could conceivably absorb five neutrons before it becomes useless as a neutron absorber. At one time samarium attracted a great deal of interest since it was supposedly cheaper than other rare earth elements. However, the metals of both europium and samarium have relatively low melting points, and cermet-type control rods of these elements would have to be used except for reactors operating at relatively low temperatures.

As previously mentioned, gadolinium has the highest thermal neutron cross-section of any element, but some of its daughter isotopes have relatively low

cross-sections. Dysprosium is also of considerable interest and is also of interest as a burnable poison in atomic fuel elements. The element erbium has a thermal neutron cross-section of 166 barns (greater than hafnium) and eventually may find application as a neutron absorber.

Of these rare earth elements, europium is five to ten times more costly than the others, and is comparable to boron-10 in cost. Economics, balanced with nuclear properties, will guide nuclear engineers in selection of

er operating temperatures are critical.

## Metallurgy

New, suitable materials are needed to withstand conditions of stresses and temperatures that are created by the rocket-propelled aircraft and missiles, gas-turbine, and ram-jet engines. These materials (metals, ceramics, and cermets) need to be relatively inert at high temperatures and also have great strength characteristics. Cermets are ceramic dispersions in metals.

Niobium, molybdenum, zirconium, chromium, titanium, tantalum, tungsten, and their alloys are the refractory metals with the greatest potential. Certain of the rare earth metals have been suggested as materials to consider with some of the above refractory metals to provide high-temperature alloy systems.

Elements melting above 2500°F (1350°C) are considered as high-melting metals. Of the rare earths, yttrium and some of the "heavy" rare earths are included in this category, along with the more commonly known refractory metals mentioned before. Table II gives relative order of melting points of "heavy" rare earth elements, along with some other physical properties.

It is interesting to note that certain physical properties of yttrium, such as density, crystal structure, and melting point are similar to titanium. Although yttrium has a lower melting point than titanium, it still has a very high vaporization point. These similarities suggest rare earth metals with titanium should be investigated.

Other "heavy" rare earths may also be the basis of high-temperature systems.

With the increased use of titanium products, recovery of scrap titanium may become a problem to the industry. Scrap titanium has high interstitials (primarily oxygen and nitrogen content). Oxygen is a serious impurity, causing embrittlement when it oxidizes the metal at the grain boundaries. A way of de-oxidizing titanium is through the use of an acceptable reducing agent added to the scrap when it is remelted.

TABLE III  
Physical Data on "Heavy" Rare Earth Oxides

Oxide	Color	Density gm/cc	Crystal Structure	Cube Size Å	Inter-atomic Distance (RE-O) Å
Yttrium	white	4.48	cubic	10.60	2.27
Samarium	pale yellow	7.43	cubic	10.85	2.33
Europium	white	7.42	cubic	10.84	2.33
Gadolinium	white	7.41	cubic	10.79	2.32
Terbium	dark brown	—	cubic	—	—
Dysprosium	white	7.81	cubic	10.63	2.28
Holmium	buff	—	cubic	10.58	2.27
Erbium	pink	8.64	cubic	10.54	2.26
Thulium	light green	8.60	cubic	10.52	2.26
Ytterbium	white	9.17	cubic	10.39	2.23
Lutetium	white	—	cubic	10.37	2.22

Source in part: "Chemistry of the Lanthanons" by R. C. Vickery, Academic Press, Inc. (1953)



Gadolinium shows promise for deoxidation of titanium. Studies indicate that most of the oxygen can be eliminated by "titanite" formation with the addition of approximately 7.5% gadolinium.

Hardness is reduced up to 50% due to deoxidation by addition of this quantity of gadolinium.

Considerably more work is required in the study of gadolinium metal with titanium. Some work is reported on alloying gadolinium with stainless steel. There will be increased interest in the metallurgical field as rare earth metals become available at lower cost.

#### Electronics

Many applications of "heavy" rare earths are in the development stages in the electronics industry. One type of compound that holds great interest is the rare earth ferrite. Under certain conditions this material appears essentially transparent to microwave energy of the type generated by radar equipment. Common usage has tended to classify all magnetic oxides that contain iron under the heading of ferrites. The rare earth ferrite is the newest member of this family. It was first reported in 1950 when the perovskite type  $(RE)_2O_3 \cdot Fe_2O_3$  was synthesized. However, the type 3  $(RE)_2O_3 \cdot 5Fe_2O_3$ , which is presently of interest for its unique properties, was not reported until 1956.

When a ferrite is placed under the influence of a magnetic field, the amount of transparency as well as the direction of transparency can be varied. This characteristic can be used in microwave components such as modulators, circulators and isolators. For example, in a radar network, the ferrite can function so that it is transparent to microwave energy in only one direction; it then functions to channel the reflected signals to the receiver and prevents them from re-entering the generator.

"Heavy" rare earth ferrites of the general formula  $3(RE)_2O_3 \cdot 5Fe_2O_3$  are being investigated for such applications. These materials are formed by

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 **THE ALCOA HOUR**  
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ALTERNATE SUNDAY EVENINGS



Check 2441 opposite last page.



Since the firm establishment of the forty-hour work week years ago, the American worker has thought of the time when an even further reduction in the time he must spend at his job might be possible. Until recently, the "thirty-hour week" has existed only in a rather hazy "someday," but this isn't the case today.\* Some unions are now beginning to show more and more interest in the shorter week.

Why a shorter week? Who will pay for it and who will benefit from it? When and how will the question actually come up at the bargaining tables? To help answer these questions, CHEMICAL PROCESSING asked O. A. Knight, President of the Oil, Chemical, and Atomic Workers, to explain his union's position on the subject. Here, then, are Mr. Knight's evaluations on the shorter week and its effects on the welfare of the industry and the American economy.

## The union looks at the short work week

**O. A. KNIGHT**  
President

Oil, Chemical and Atomic Workers  
International Union, AFL-CIO

There is no question that the work week will be shortened; nearly everyone believes this will happen, although some will not say so. The worthy points of speculation at this time involve simply the details of how and when this will come about. How rapidly will reductions come? By what stages and what timetable? Will the reduction come in the form of fewer days per week, or fewer hours per day? What forces will bring about the reduction of working hours?

During the past two or three years there has been a minor but significant reduction in the total hours of work per year. This has taken the form of longer vacations and more holidays. A great many people are enjoying a week more of annual paid vacation this year than they had two or three years ago. A great many have received one or two additional paid holidays.

While this reduction in hours of work has not taken the form of a shorter work week as such, it amounts to the same thing from the standpoint of the employer's cost accounting and from the standpoint of the worker desiring more leisure time. Full statistics are not available, but it is not unreasonable to say that the typical chemical worker spent 40 to 50 hours less in the plant during the past year than he did

in 1954. This is the same as if the work week had been reduced to 39 hours or a fraction less.

This represents a minor adjustment in the relative number of working hours and leisure hours. It has come about because of the natural forces pressing for more leisure and less work, but these forces have not yet built up to the point of sharply reducing the work week itself on a formalized basis.

When the pressures for shorter hours of work reach a certain point, the work week will be reduced. The desire of working people for more leisure time is one of these pressures. The ability of employers to grant more leisure time without reduction in take-home pay (along with the collective bargaining prowess and strength on each side of the bargaining table) determines how quickly this pressure for more leisure is accommodated by reduced hours.

### A Greater Need

But the desire for more leisure time is secondary to a greater factor. That factor is the health of the over-all economy. The needs of the total economy for labor and the requirement of a healthy economy for essentially full employment will basically determine the hours of work to

be performed per day, per week, per year.

This is a somewhat new development. In the past, the major pressure for shorter hours of work has been the desire of working people for more rest and leisure. Men fought for the eight-hour day because it was physically and mentally distressing to work more than eight hours a day at the typical job. Men fought for the 40-hour week in order to have another day to enjoy God's sunshine and some of the other pleasures of life.

Now hours have been reduced to the point that workmen are no longer under physical or mental strain (a few jobs being exceptions). Of course the typical person would like to work less and play more, and for that reason he supports the general principle of a shorter work week. It must be candidly admitted, however, that this support for still shorter working periods does not reflect an immediate or pressing desire for more rest and recreation, as was the case in an earlier era when 10 or 12 hours of work a day, six days a week,

\*That "someday" is beginning to be even less hazy. Since this was written, the Union Packinghouse Workers (UAW-CIO) declared that the 40-hour week was "economically obsolete" and announced that the union would campaign for a 30-hour week in both the legislative halls and across bargaining tables. —ED.

was commonplace. Today, when the typical worker is offered an alternative between 1) a shorter week with the same take-home pay, or 2) a continuation of the 40-hour week with increased take-home pay or other benefits, he generally will choose the 40-hour week with more money or benefits.

#### Shorter Week Exists Now

Some people already are working under a formalized 37½-hour week, consisting of five seven-and-a-half hour days. This shorter day is most typical among white collar workers in large cities. Among blue collar workers it is found mostly in those same cities, or in trades and crafts where the labor is relatively grueling. This indicates that when the hours of commuting to and from work are long, or when the work really is a grind, the shorter day is attractive. Fortunately, with modern push-button equipment and cleaner, better-ventilated plants, most modern industrial jobs are less exhausting than they used to be. In such relatively comfortable jobs, the desire for rest and recuperation as such is not today a basic motivation toward shorter work weeks.

That is why there has been little shortening of the work week during the past decade, a period in which union bargaining has been strong and industry economics would have permitted such change if demanded by the workers. With full employment and the opportunity to negotiate higher wages and broader fringe benefits, reduction in hours has not been a major attraction to working people. The small adjustments made — in the form of longer vacations and more holidays — reflect a change in our society: more automobiles, more opportunity and more social inclination to take vacation trips and holiday jaunts.

#### Economic Pressures

The further shortening of the work week will be dictated not so much by a desire for more time off as by economic pressures. We have developed a wonderfully productive industrial

economy. It is turning out goods at an ever-growing rate, not only in sum total but also per hour of labor employed. There seems to be no limit to how far this increase can go.

*If the worker is to turn out more goods each hour he labors, he must consume more goods; or, he must work fewer hours to pull production down to the level of purchasing power.*



O. A. (JACK) KNIGHT, president of Oil, Chemical and Atomic Workers International Union, AFL-CIO, and a vice president of AFL-CIO, has been a union leader since 1933.

In 1926 Knight went to work for the Shell Oil Co. refinery in East Chicago, Ind. In 1933 he helped organize his plant and helped establish the large Hammond, Ind., local of the Oil Workers International Union. In 1936 he was elected rank-and-file member of the union's International Executive Council.

In 1937 Knight resigned from Shell to accept a post as union organizer, continuing in this job until 1940 and working mostly in California. He was elected president of the Oil Workers International Union in 1940, and in 1947 he was elected vice president of the CIO.

During the period of negotiations leading to the AFL-CIO merger, Knight represented CIO on the unity committee.

In 1954-55, he was instrumental in bringing about the merger of his union with the CIO Gas, Coke and Chemical Workers. This culminated on March 4, 1955, with the establishment of the Oil, Chemical and Atomic Workers. On that date Knight was elected president of the merged union by acclamation.

There are three natural methods and one artificial way of balancing consumption and production. Artificially, our heavy expenditures on defense help maintain a balance. Naturally, a production-consumption balance can be maintained by 1) reducing prices in proportion to the increase in productivity so that the physical volume of consumption may keep up with production while using the same number of dollars in circulation; 2) raising wages in proportion to the increase in productivity so that the people may buy a proportionately increased volume of

contention in organized labor that wages have not increased as rapidly as has productivity, but wages have increased more rapidly than the cost of living. This has amounted to some productivity-based wage increases which have enabled wage earners to purchase some of the increased volume of consumer goods. This factor, plus the effect of our defense spending, has maintained our prosperity.

Following alternative number two seems to have contributed to limited inflation. Many economists assert that in a full-employment economy a creeping

goods and services; or 3) reducing hours of work while maintaining the same take-home pay so that we will produce only what we can consume.

The nature of man being what it is, we view with doubts the possibility of alternative number one taking place on a broad scale. Alternative number two has been followed during the past few years to a partial extent. It is our

two- or three-percent a year inflation is inevitable. Roughly speaking, we have been following just that trend. Whether or not that is bad depends on one's viewpoint — and his personal source of income. To the typical wage earner, it is a relatively comfortable circumstance.

Some cold-blooded people — and this view was expressed a few months ago in a leading commercial journal — think that a pool of four or five million unemployed workers is the best insurance against inflation. It would cause a bidding down of the price of labor and perhaps of the price of goods. But American working people will not tolerate this cure for inflation. Never again will they stand by for a repetition of the depression of the early thirties. Neither, I trust, will any other substantial element of our society.

#### A Dozen Cars?

If and when the other alternatives fail to balance the buying power of the people with the increasing rate of production, alternative number three, the shortening of working hours, will be followed. It seems unlikely that wages will continue to rise indefinitely. If they do, and in view of our amazing productive gains, eventually we will have not two but a dozen cars in every garage. Most of us would consider that too much of a good thing . . . a nuisance.

At some point along the road, buying will slow down, production will be cut back, and we will face the alternative of having some people work forty hours while others go hungry, or of having everyone work fewer hours. Every pressure in our modern and relatively humanitarian society will move for the alternative of having everyone work fewer hours.

The timetable for this I would not predict.

In some industries, pressure already is strong for a shorter week. It may come about soon in auto manufacturing, for example. In the chemical industry, the pressure at present is stronger for further benefits than it is for shorter hours. In principle, our

To next page



## After 18 years in service making SPRY... Bridgeport Duplex Tubes still deliver top performance



Two of seven heat exchangers in which Bridgeport Duplex Tubes have established an unusual 18-year performance record at Lever Brothers.

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## BRIDGEPORT CONDENSER TUBES

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Check 2442 opposite last page.

## Short Work Week

From preceding page

union has endorsed the 30-hour week, but we have set no timetable for it nor have we implemented this principle with an actual program. Whenever hungry men appear at our gates, the members of the Oil, Chemical, and Atomic Workers International Union will begin to press hard for shorter hours.

## Economy Dictates Timetable

When this will take place depends on the economy as a whole. The gains in productivity would make the circumstances appear to be just around the corner, but on the other hand many students of population point out that we are more likely to have a labor shortage than a labor surplus until the post-war baby crop appears at the employment office in the mid-1960's. One thing is certain: In many industries a sharp reduction in the work week today would be a paper adjustment only, for production requirements would cause the working of considerable overtime, bringing the actual hours in the plant back up to near-current levels.

Those of us in the labor movement are often asked, "How would you take shorter hours? Fewer days per week? Fewer hours per day?" This will vary from job to job, depending on the exertion required on the job, the commuting problem and the outside interests of the workers.

It can be safely said that fewer days per week is the favorite form of hours reduction of workers in most chemical plants and oil refineries. Our union newspaper took an unofficial, informal straw vote a few months ago and confirmed this fact — far more members of our Union favored the fewer-days alternative than any other method of shortening hours. Generally, they are satisfied with the eight-hour shift.

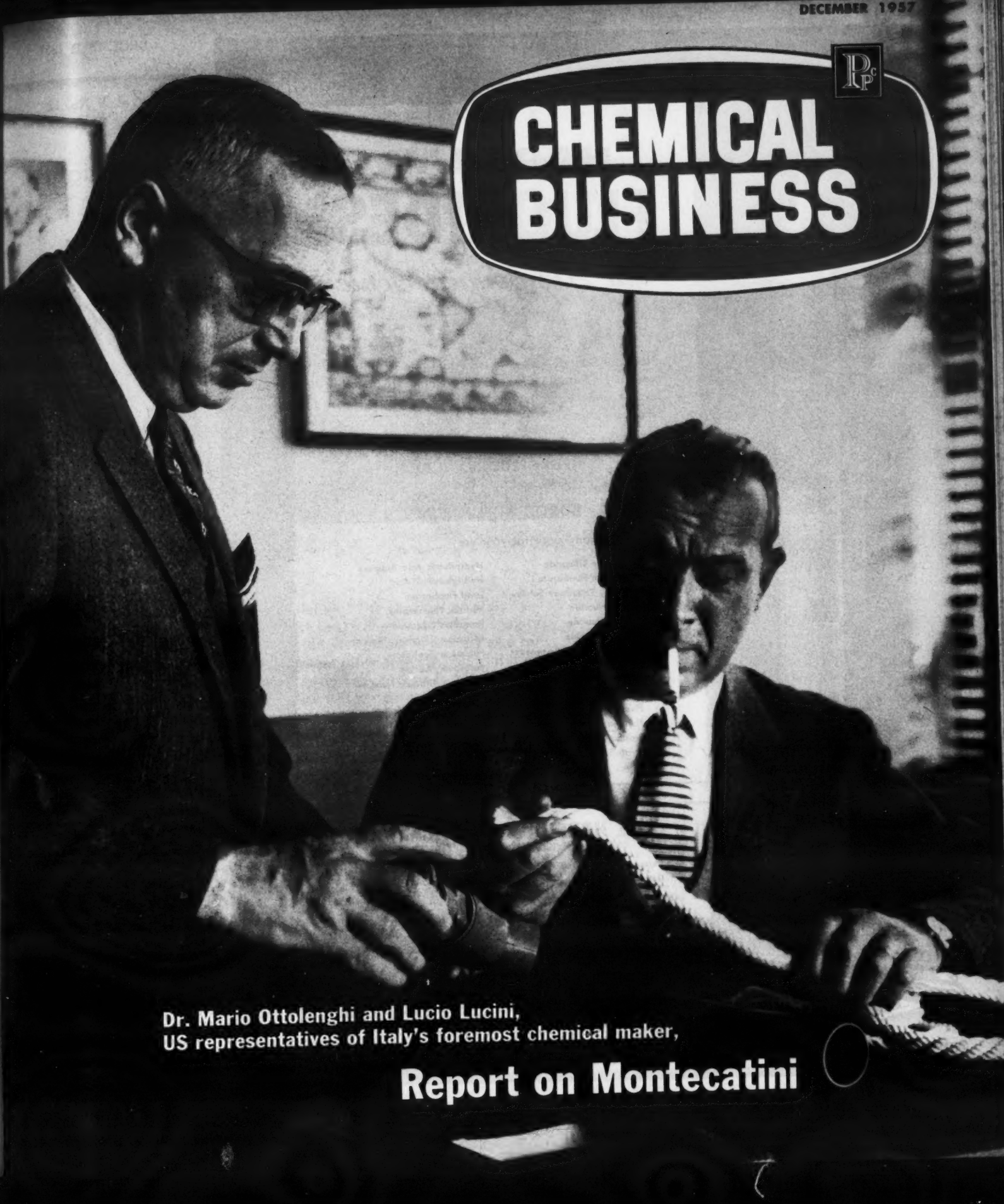
Getting to and from work consumes some time, so they would like to make the trip fewer times. A full day off gives more opportunity to engage in hobbies than does an

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# CHEMICAL BUSINESS



Dr. Mario Ottolenghi and Lucio Lucini,  
US representatives of Italy's foremost chemical maker,

## Report on Montecatini

## Highlights

Montecatini's US representatives discuss the present and future of Italy's foremost chemical company, hint at possible US operation

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Harvey Aluminum cuts price on titanium mill products, probably forcing across-the-board price reductions by all producers

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Follow-up on the President's Small Business Conference. Plans for continuing aid program are shaping up

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Carbide announces ethylene oxide polymer, looks to markets in packaging, cosmetics, and coatings fields

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Chromium Fluoride	Potassium Fluoride
Copper Fluoborate	Potassium Titanium Fluoride
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Check 2443 opposite last page.



**Chemore's Lucini:** "The decision on a US plant probably hasn't been made yet in Milan"



"Montecatini will license the polypropylene process only after it's proved commercially"



"It's hard to arrive at a firm price for a material just going into full production"

In the past few years Montecatini — "The Du-Pont of Italy" — has been of considerable interest to US chemical makers, mainly in terms of world sales competition. But recently, largely as a result of the company's polypropylene developments, that interest has been growing. Two biggest questions today: Is Montecatini planning a US operation and how will polypropylene affect the US plastics business?

Here, in an exclusive interview with Montecatini spokesmen, are some indications and an up-to-date...

## REPORT ON MONTECATINI

By now the first samples of Montecatini's polypropylene will have reached American plastics molders and fabricators. And although no samples of the molding powders have previously been available — and only a few pieces of Montecatini's moldings have even been seen here — the path to the door of the company's US representatives, the Chemore Corporation, has been fairly worn bare since the thermoplastic was first announced.

Yet equating if not exceeding the interest of po-

tential customers has been the interest of potential competitors, not only polyethylene producers but makers of nylon, vinyls, and rayon.

Chemical Business asked **Lucio Lucini**, Chemore's president, and **Dr. Mario Ottolenghi**, vice-president, the questions most frequently posed by US chemical makers. Here are their answers.

On cost: "Of course it's hard to arrive at a firm price for a material not yet marketed and only now going into production," explained Lucini. "We feel sure, how-

ever, that polypropylene will be competitive with other plastics in similar applications. We probably won't quote a firm price until the samples have been in the hands of many customers for a while."

Indications are that polypropylene molding powders can be sold at a price somewhere in the neighborhood of that of high-density polyethylene, although it might be a little higher.

"It's hard to compare the per pound price of the material with that of polyethylene, however," explains

Ottolenghi, "because polypropylene is less dense than polyethylene. A pound of polypropylene will yield more molded units or more feet of film than a pound of polyethylene."

"One factor in the price, certainly, will be the cost of propylene," continues Ottolenghi. "Right now, for example, in the US, propylene is selling for around four cents a pound, ethylene is about five cents. This would indicate a pretty favorable raw material situation. Of course, when the demand for propylene goes up the



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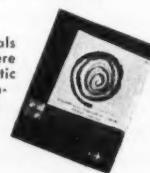
But, CDC has gone further: CDC has adapted or developed the necessary control components to translate theory into highly advanced practice. CompuDyne Control Systems are achieving results today that were labeled "impossible" only two years ago.

If you have a single control point or a complete process that will not (for any reason) control to the accuracies you require or would like to achieve, it will pay you to call CDC. You risk little — because CompuDyne Control is engineered and installed on a guaranteed performance basis.

Telephone, wire or write for full information.

### JUST RELEASED:

A new bulletin entitled, "VALID DATA." It deals principally with aeronautical test facilities where dynamic process control has had its most dramatic growth. It should be interesting to anyone involved in process design or control. A copy will be sent to you without obligation.



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## Montecatini

From preceding page

cost might change considerably."

There's also the question of supply. Montecatini's Milan, Italy, plant has only a 15 million pound capacity when in full production. It's almost certain that US buyers won't get the bulk of the production and sample quantities of the material will even be in pretty short supply.

Says Lucini on supply: "The plant, of course, is designed to be expanded as the demand increases, and we have every reason to expect that it will very quickly. There's little doubt that much more material will be available very soon."

US companies may also be having a pretty quick effect on the supply of polypropylene. Although none has made any formal announcement of polypropylene plans, it's well known that a number of American chemical makers are extremely interested in producing the material. (CHEMICAL PROCESSING, November, page 29).

And there's a pretty complex question about who is going to be producing the material by whose process.

On licensing, Lucini explains: "Montecatini has traditionally licensed its processes to interested companies. As a matter of fact, we have a number of licensing arrangements on other products here in the US. But the policy has always been to prove a process commercially before it is licensed out. This is the case with the polypropylene process.

"A great number of companies have contacted us about the process and some will be given an opportunity to enter an agreement just as soon as we feel that the process is sufficiently proven."

Yet other industry sources report that interest in the process among US companies is declining somewhat. A year or so ago when US interest was at its

peak, the path to Chemore's door was again worn pretty thin. But when the candidates found that they would have to wait until Montecatini was already in the polypropylene business before they could start anything some of them went back to their own labs.

Those who had already been working on polypropylene — and some of the projects didn't begin yesterday by any means — boosted their own research efforts in an attempt to be on the market as soon after Montecatini as possible. These efforts are close to paying off about now for at least three companies.

Of course, there will probably be some licensing arrangements even for those companies who have developed their own process. Some of those who developed their own high-density polyethylene process also hold a Ziegler license for various reasons.

But the question asked by most US chemical makers is whether Montecatini is planning to set up an American plant.

"First of all," explains Lucini, "we just don't know. And the decision probably hasn't been made in Milan yet."

(It's significant, though, that Montecatini has bought

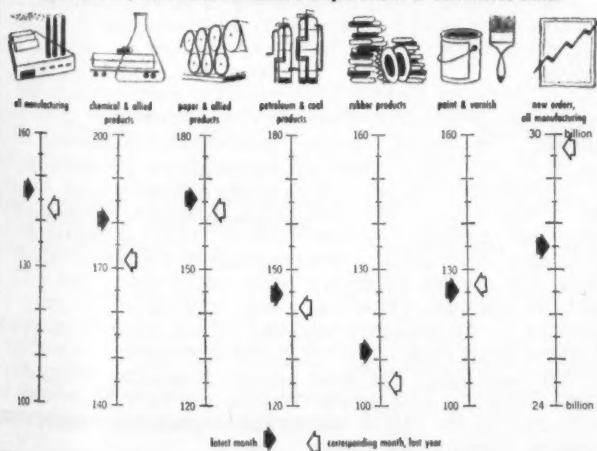
a plant site in West Virginia that it optioned a few months ago. And it also has been discussing terms with a propylene source in the area.)

Lucini continued, without mentioning polypropylene specifically: "Several factors will dictate Montecatini's choice of whether or not to build a plant here. The market for a particular material will be a great factor. Also marketing and production costs — raw material, shipping, sales costs — always have great influence on plant location.

"I can tell you this, however: Although Montecatini feels justifiably that it has research and engineering talent and knowledge equal to that of the standards set by the US chemical industry, we're sure that there's certainly a lot we can learn here concerning marketing methods and techniques. Marketing of chemicals and chemical materials in Italy alone, for example, is quite different from selling on a larger scale — say, in the common European market. We believe that experience gained from studying marketing techniques and conditions in the United States will help us not only here but in this common European market should it develop."

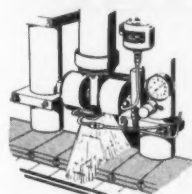
## chemical business INDEX

Production indices, from latest available Federal Reserve Board figures, based on 1947-49=100. New Orders, All Manufacturing, (last column) from latest available Department of Commerce data.



## Radiation Chemistry Sheds New Light On Straight-Chain Hydrocarbons

There are many ways you can hammer a problem into shape. When the problem happens to be the modification of a chemical compound, the most modern hammer you can use is nuclear radiation. Under the impact of the terrific energies provided by nuclear radiation, many chemical compounds can be forged into new shapes.



A while back Archer-Daniels-Midland people decided to snoop into the effects of high energy radiation on some of their saturated straight-chain hydrocarbons. It developed, however, that both the saturated hydrocarbons and some of the straight-chain olefins stolidly clung to their normal personalities. They sat there unmoved and unimpressed by sizzling gamma rays and whizzing electrons.

This frustrating development nevertheless has a bright side. It sheds new light on one of the many interesting ways in which these ADM products differ from petroleum-derived hydrocarbons.

### Stable Under Radiation

Key to the situation is the orderly straight-chain structure of hydrocarbons derived from tallow, marine, or vegetable oils, quite unlike the branched-chain ones made from petroleum. The latter are less stable under radiation because high energy waves or particles have a fairly easy time splitting off the side chains. As a result, there is a greater likelihood that free radicals will be created. This leads to oxidation, polymerization, and other unsettling changes in the original molecular structure of the petroleum-derived hydrocarbons.

A practical example of all this is in the way radiation adversely alters the properties and performance of grease built with ordinary branched-chain hydrocarbons. The gel structure, the gelling agent, and the oil portion all are damaged.

### New Lubricant Horizons

Since radiation isn't as likely to tamper with the long, straight-chain saturated hydrocarbons . . . and since they are excellent lubricants and lube additives . . . they are clearly of interest in lubricants for use in nuclear power plants. Military applications also are of importance although still shrouded in secrecy. Other uses in radiation bombarded locations are easy to contemplate.

Fat-derived olefins and hydrocarbons currently cost a bit more than hydrocarbons from petroleum. No one is suggesting them as a complete replacement for their petroleum-based cousins. But there are specialized applications where they are of great interest.

If you are involved in developing new products or improving old ones . . . if you are looking for a startling new chemical with untapped potential . . . why not give a little attention to the saturated hydrocarbons obtained by hydrogenation of straight-chain olefins? We'll be delighted to send you technical information, samples, or have an ADM Chemical Technical Representative call on you.

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Check 2445 opposite last page.

GRACE CHEMICAL REPORTS:

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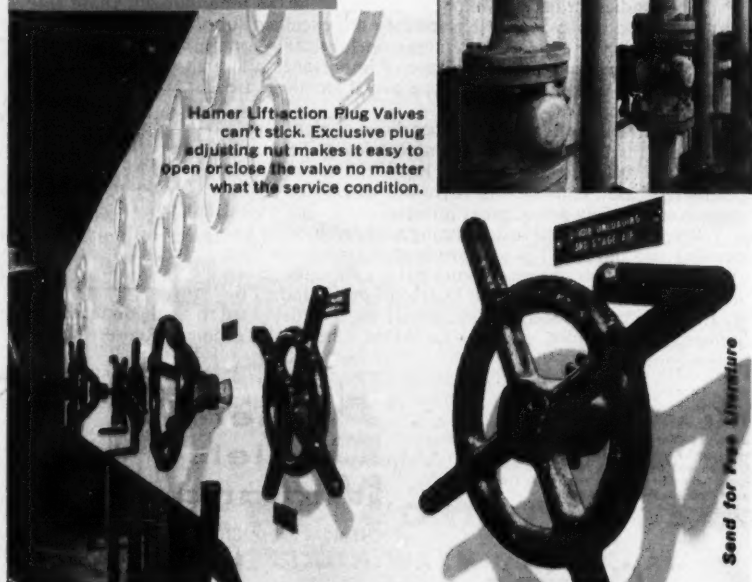
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**CHEMICAL  
BUSINESS**

**Marketing**

## Price Break of 30% May Spell Titanium's Future

The titanium business, already pretty much in a state of chaos because of the recent cutbacks in the aircraft industry, is going to be dealing with another factor in the near future: a substantial price reduction on at least some mill products. The cause: a quote to the Air Force for titanium billet 30 percent under the price now on the books for comparable material. The effect: much pushing of competitor's sliderules and sharpening of pencils. The ultimate effect: titanium's finally coming of age?

Harvey Aluminum, a West Coast fabricator, has made a bid of \$5.50 per pound for 7½ inch billet, a material now on the titanium price lists at just under \$8. And as the rumor — at that time just a rumor — spread around the recent Metals Congress at Chicago, titanium people had a lot of questions: "Is this a firm list price? Just what is the material being bid on?" And the biggest question: "Can it be done without losing money?"

Harvey's Gil Moudry answered the questions. "Yes, we can do it without losing money. Yes, it's the same material now on the lists for about \$8 (Pratt & Whitney 682 specs, 6 aluminum, 4 vanadium, random length, machined). Yes, this is our selling price to all comers."

Competitors, when queried about meeting the price, showed varying reactions, but all agreed that it was a good thing and that the price would be met if it could be shown to be realistic.

Said Titanium Metals' Director of Marketing Tom Lippert: "Although there are some smaller problems in marketing titanium, the big problem — and the only real problem — has been cost. And TMCA, you know, has always taken the lead in titanium price reductions — six separate reductions since 1954.

"Will we meet the new price? With our new equipment coming in, TMCA can produce titanium as cheap

or cheaper than anyone else. But no company will go off half cocked and lower its price until it's sure that there's sound economic justification for it. We want to see the \$5.50 billet actually shipped. Then we'll talk about a new price list."

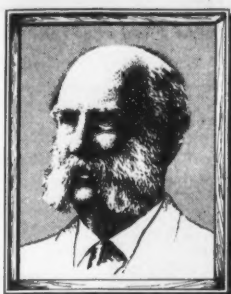
USI's Manager of Metals Marketing, Bill Greenleaf, (USI is one parent of the newly-formed Mallory-Sharon Metals) showed somewhat more enthusiasm. "I think it's wonderful! The titanium business has been dying on the vine because of the high prices. What we've needed is a shot in the arm."

On prices, he continued: "Of course the majority of the titanium producers can and will compete with Harvey. And with this particular price established, the whole price list — sheet, bar stock, and so forth — will be readjusted accordingly, and pretty quickly at that. This will get the whole industry off the ground."

The titanium industry has indeed been on the ground, largely because of the military cutbacks. Early this year the Air Force set its titanium requirements at 22 million pounds in 1957, 30 million pounds in 1958. With these figures in mind, the industry set about its expansion program, and is still pretty much committed to complete it. But with the bottom out of the market — 1957 will end up with only 12 million pounds shipped, 1958 is expected to see only 5 or 6 million shipped — probably over 50 percent of the capacity is going unused.



Excerpts  
From The  
Chemical  
Hall of  
FAME



## James Mason Crafts (1839-1917)

In 1911 Crafts was awarded the Rumford medal by the American Academy of Arts and Sciences for his investigations into thermometry that were so accurate they are still regarded as classics.

By 1911 Foremost's El Dorado Division had been stressing purity and uniformity in their production control for nearly two decades.

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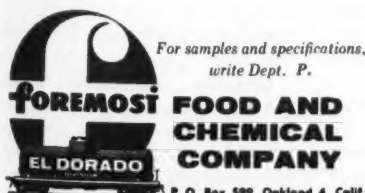
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## Labeling Conference Suggests 'Seven Senses'

"The chemical industry has been most prominent in displaying a 'social conscience' in regard to safeguarding not only its customers but also its own employees," says Cyanamid's John B. Williamson, speaking at the recent Precautionary Labeling Conference sponsored by the Manufacturing Chemists' Association. "Our safety level is high — accident rates are lower than most other industries. And as labeling practice began as a voluntary program, industry must maintain leadership in suggesting and guiding future legislation."

General feeling at the meeting: Although most state legislation is based on principles laid down by the Labels and Precautionary Information Committee, they do differ considerably and more are being enacted constantly. Maybe industry would be better off — though no one really wants it this way — to suggest and back federal legislation that would act as a guide to state regulations.

Current proposed legislation will cover retail packages intended for household use but will not affect commercial packaging. These are flexible bills which leave the burden of proper labeling largely to the manufacturer.

Feeling was high that the best defense against excessive legislation and control is a good offense. Industry might well use what Pennsalt's N. M. Walker termed "the seven senses," sight, hearing, smell, taste, touch, and two additional, common and horse.

According to Williamson, "each chemical product is unique and must be treated separately on its own specific properties and hazards. Statements on labels should be brief, accurate, and easy to understand. Label only when, and to the extent, necessary."

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\*du Pont Trademark

For further information, write for Bulletin AD-158.

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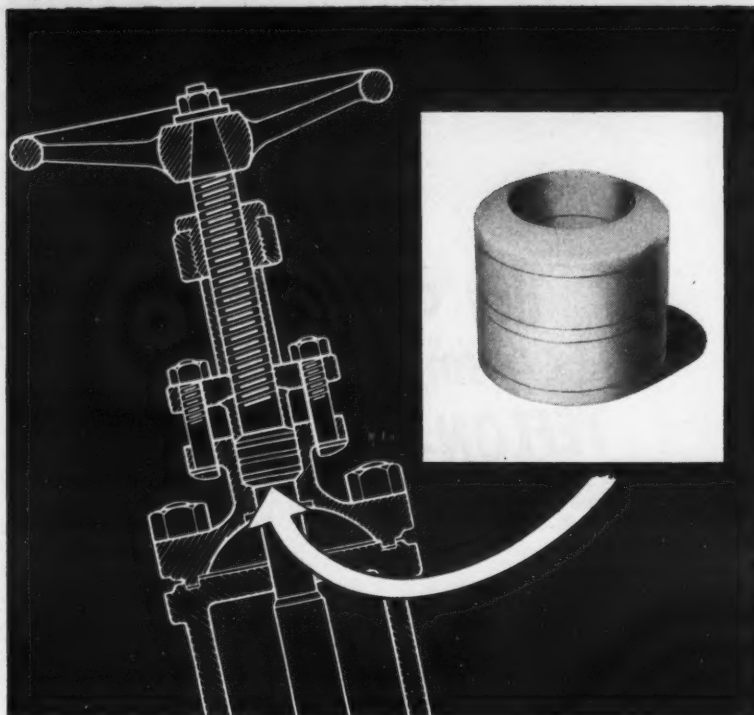
United States Gasket *Plastics Division*

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Check 2447 opposite last page.

DECEMBER 1957



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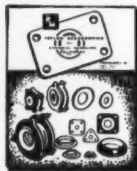
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Check 2449 opposite last page.

**CHEMICAL  
BUSINESS**

**Government**



President Eisenhower addresses the Small Business Conference group

## The President's Conference: A Later Look

Amid traditional cries of government neglect of small business, the recent President's Conference is showing signs of being the starting point for some concrete programs. The conference, avowedly an experiment, sought to identify research problems of small business groups and then make recommendations for a continuing program to help solve these problems. Issues of taxation, labor relations, and government contracts weren't considered within the scope of the meetings.

**How successful** was the effort? The consensus among small business groups is that the meeting succeeded in pinpointing research problems in the research and marketing areas, and highlighted the avenues of available information.

To evaluate such a large-scale effort in terms of the individual small businessman isn't easy; however, there is evidence of continuing interest in following in the path established by the conference.

Typical of replies from a post-conference questionnaire were the following:

"The conference could make an invaluable, perma-

nent contribution if it can become the incubator for a sequence of such meetings."

"There could be a recommendation for continuing action which might eventually result in mature proposals for problem solution. For example, there should be continuing meetings at the local level to consist of small business representation, local experts, and visitors familiar with the national picture. Both local and general problems might be considered. These local meetings would be assisted by summary publications of information and by a monthly letter. The gradual maturing of thinking at these local meetings might be summarized in annual national meetings such as the past one."

**Besides disclosing** what the attendees liked most—the fact that there was a meeting at all—the survey revealed as well what they liked least: lack of workshop and discussion time. This objection might be met in large measure by the smaller, local conferences.

Indication of positive action in setting up local conferences is being received by the President's Commis-

CHEMICAL PROCESSING

tee in the requesting outlining meetings. these re handboo pared w in organ out an e local con

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Mons build a plant a be star 1957, th to be o of next The urea in lution ammon come fr Dorado

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tee in the form of letters requesting assistance and outlining plans for smaller meetings. As a result of these requests for aid, a handbook has been prepared which outlines steps in organizing and carrying out an effective program of local conferences.

#### The follow-through

The contribution to be made by the President's Conference will depend in large measure upon the interpretation of the findings. The proceedings will be published at a later date and an Action Committee has been formed to develop an "action program" out of the results. **Dr. Eric A. Walker**, President of Pennsylvania State University and General Chairman of the Conference, stated the committee's aims as follows: "It is expected that such a program might suggest what can be done by the Federal Government, the Congress, or the Executive Department, by universities, by large industry, and by the small businessmen themselves to get the utmost benefits from research. If this program calls for new legislation, new services, or new organization, and we so suggest it an 'Action Report,' the President will then have written suggestions to place before the Cabinet Committee on Small Business and the Congress. In other words, our real aim is to define a program for action..."

#### Monsanto Maps 100 Ton/Day Urea Unit

Monsanto is planning to build a 100 ton per day urea plant at El Dorado, Ark. To be started before the end of 1957, the plant is expected to be on stream by early fall of next year.

The plant will produce urea in both prilled and solution forms. Feed stock, ammonia and CO<sub>2</sub> will come from the company's El Dorado chemical operation.



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Check 2451 opposite last page.

## **Carbide Announces Ethylene Oxide Polymer**

Latest of the new plastics to gain prominence this year — others are polypropylene and GE's polycarbonates — is Carbide's new ethylene oxide polymer. Properties of the recently announced material would seem to indicate rather wide use in the cosmetics field as well as in packaging and other areas.

The high-molecular weight resins, available now in pilot quantities, are completely soluble in water, yet films of the materials have remarkable resistance to



One-percent solution of Carbide's ethylene oxide polymer indicates the material's thickening properties

water vapor penetration. These properties lead Carbide to eye the packaging field, where the plastic might be used for such individually packaged products as soaps, insecticides, or dyes (CHEMICAL PROCESSING, October 1956, page 146.)

Other potential uses: warp sizing of cotton and synthetic yarns, cosmetic and soap formulations, pharmaceutical products.

The material suggests a number of applications as a thickening agent. Very low concentrations of the resins, tradenamed Polyox, produce high viscosity liquids — a mixture of 25 percent resin and 75 percent water produces a dry-feeling, stable, rubbery gel.

CHEMICAL PROCESSING

## Spotlight on people

New presidents of Carbide divisions . . . **George C. Miller** is made president of Union Carbide Realty and **R. K. Turner** becomes president of Bakelite. And at Carbide's Linde Company division . . . **Dr. L. I. Dana** becomes vice president—research and development and **David Swan** is made director of research.

**Alfred J. Dickinson** joins Freeport Sulphur as vice president and sales manager succeeding the late **Roy B. Johns**.

**Albert E. Cleghorn**, previously executive v-p of Allied's National Aniline division, has been named president of the division. He succeeds **Donald G. Rogers** who is retiring after 42 years with Allied and predecessor companies.



Cleghorn

With Foster Grant's election of four new vice presidents, **Jacob Chatkis** becomes v-p and secretary; **Dr. Sidney J. Baum** is made v-p in charge of polymerization; **Milton W. Bernstein** is new v-p in charge of sales for the molded products division; and **Dr. F. Drew Mayfield** is elected v-p in charge of company's monomer plant in Baton Rouge.

**Conrad G. Hurlimann** is elected director and vice president of Pfizer International Subsidiaries.

**Laurence E. Russell**, CHEMICAL PROCESSING Editorial Advisory Board member, is appointed director of marketing for organic chemicals division of Olin Mathieson. **Elmer M. Richardson** and **George A. Waterman** join Olin Mathieson as director of marketing and director of product sales and engineering for Olin Aluminum, respectively.



Russell

Rowe Products appoints **James J. Sodaro** new director of research.

**John W. McGovern** is elected president of US Rubber Company and designated chief operating officer by board of directors. The board also designated vice presidents **Eugene A. Luxenberger** and **George R. Vila** group v-p's.

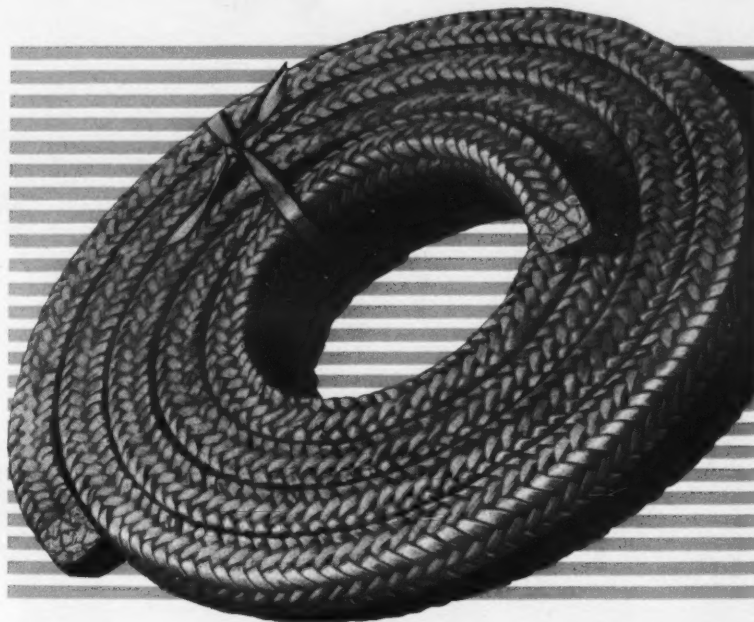


Vila

Sun Chemical announces **John S. Thome's** election as vice president.

Merck & Company's board of directors elects two new presidents of company divisions. **Dr. Antonie T. Knoppers** is made president of Merck Sharp & Dohme International while **Dr. Max Tishler** becomes president of Merck Sharp & Dohme Research Laboratories.

# Belmont braided TEFLON



## a positively corrosion-resistant compression-type packing

Belmont braided TEFLON Yarn, No. 3085, and braided TEFLON ribbon, No. 3055, combine the complete corrosion resistance of pure du Pont TEFLON—impervious to acids, caustics, oxidants and solvents—with the rugged mechanical structure of Belmont's unique CRISS-CROSS Braid.

A revolutionary departure from conventional braided constructions, the strands in this braid criss-cross from the surface, diagonally through the

body of the packing—each strand becoming an integral part of the whole.

Result—a packing that will outlast other type packings many times over in corrosion service. That can't be eaten up by chemicals. That won't ravel, wear through or slough off.

Available in coil and reel form and in ring form with open-cut square joints.

Also available in TEFLON-impregnated white and blue African asbestos.

### Ask your Belmont Distributor

Such leading Packing Distributors as:

**Mineral Products Company** and **Peerless Supply Company**  
in St. Louis, Missouri and in Shreveport, Louisiana

are ready to serve you promptly and helpfully, wherever you are.

**The Belmont Packing and Rubber Co.,** Butler & Sepviva Sts., Phila. 37, Pa.

# BELMONT

Check 2452 opposite last page.



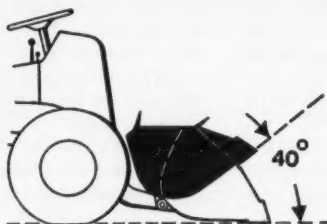
“... moves more material...  
cuts rail-car unloading time...  
keeps floors cleaner.”



**15-YEAR  
PAYLOADER  
USER**

## \*40° ROLL-BACK AT GROUND LEVEL

Develops powerful digging force — brings bucket close to machine for maximum stability and carrying capacity, and least spillage loss while transporting loads.



Magee Co-op, a chemical fertilizer manufacturer at Magee, Miss. have been using "PAYLOADER" tractor-shovels for fifteen years to unload rail cars of raw materials and to move fertilizer for bagging and unloading operations. They recently added a new-style model HA "PAYLOADER" to their fleet, and Mr. O. M. Ainsworth, the Plant Superintendent is pleased with its performance as he reports:

*"We have been using Houghs for about 15 years and the success we have experienced with them was our reason for buying the new-style model HA 'PAYLOADER'. It has increased production load delivery, matching older, larger tractor-shovel on the same job. New design roll-back bucket action has cut rail car unloading time, keeps floors cleaner, moves more material."*

Chemical and fertilizer plants of all kinds and sizes report the same kind of superior performance from their new-style "PAYLOADER" tractor-shovels—the greater digging power and carrying capacity of the roll-back bucket action, the reduction of spillage loss with the hydraulic load shock-absorber, lower maintenance and easier operation. It will pay you, too, to find out what a modern "PAYLOADER" can do to increase production and reduce the costs of handling loose, bulk materials. Your Hough Distributor is ready to demonstrate. Also ask him about Hough Purchase and Lease Plans.

### THE FRANK G. HOUGH CO.

744 Sunnyside Ave., Libertyville, Ill.

Send more "PAYLOADER" information on:

- ☐ Model HA (2,000 lb. carry capacity)
- ☐ Larger models (up to 9,000 lb. carry capacity)

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

12-A-2



**PAYLOADER®**

MANUFACTURED BY

**THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.**

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

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## Solve the Manpower Shortage NOW

From page 26

all concepts that will fall under pretty careful scrutiny by industry before they are accepted, if, indeed, they ever are. Yet it's entirely possible that something of this magnitude may be necessary if a workable plan is ever to exist.

### Other Areas

Probably no single plan submitted is the whole answer to the problem. Yet all suggest areas to search for ideas. An intense public relations program is often suggested. To be coordinated by a central agency, the program might embrace such functions as distribution of a myriad of publications, films, speakers, vocational aids; it was even suggested that breakfast food boxes would be a fine place to promote science — "If you sell Roy Rogers on a cereal box, some greats of science could be sold the same way."

Most contributors have frequent suggestions concerning aid to high school teachers. Since the teacher is probably in the best position to influence the student, it was felt that he should get much more attention. And besides whatever direct aid the teacher might receive — increased salary, vocational aids, various other printed material, and such — it's felt that he should be made to feel that he is more a part of the sciences. One way might be to invite him to join more industry professional groups, possibly as

an associate member.

Another thought running through the various plans is that men in industry — not just the college recruiters — should be made available to the youngster for counselling purposes. Talking to a "real live" research director or company officer might have much more impression value to a high school student than all of the booklets available to him.

Where, then, do we begin? The national organization still exists only on paper, the society invitations to teachers are still unextended, the financing is still undone. Or maybe none of these is the real answer. If that is the case then the real answer still hasn't been found.

Probably no industry looks to the future more than the chemical industry; no industry depends more on the scientist for its existence. And no industry is in a better position to take the lead in providing for these scientists of the future. ■

### What's your opinion?

Perhaps you have your own ideas about this subject. Why not express them openly in the Letters from Readers column (page 12) especially made available for this purpose. Send your letter to:

The Editor  
CHEMICAL PROCESSING  
111 E. Delaware Place  
Chicago 11, Illinois

### Research — product development

How significant research data is used in product development is subject of 99-page report. Executives from Du Pont, Westinghouse, and American Can Co. describe how their companies have converted ideas into new and profitable products. To obtain Special Report 20, "The Commercialization of Research Results," remit \$3.00 (AMA members \$2.00) direct to American Management Assn., Inc., 1515 Broadway, New York 36, N.Y.

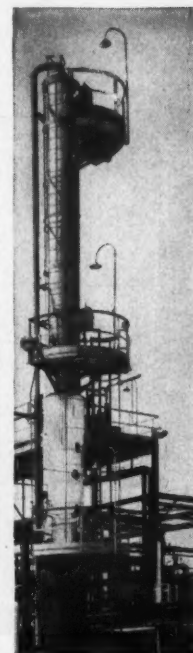
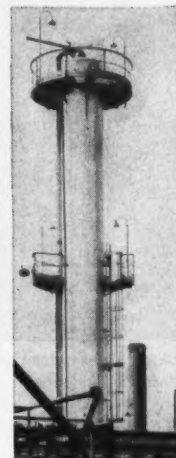
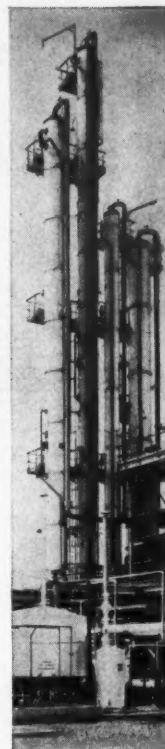
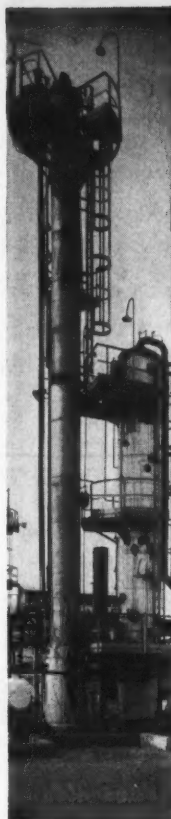


"Come, come, Higgins,  
cheap threats will never  
get you that raise."

Our thanks to Bob Brown, Douglas Aircraft Co., Santa Monica, Calif.

## FROM A VAST CRESYLIC RESERVOIR \*

... NEW ADVANTAGES FOR  
YOUR END PRODUCT!



\*The first completely continuous processing plant for cresylic acids, cresols and phenols.

■ PITT-CONSOL's new continuous process of refining has created new high quality standards in the manufacture of cresylics.

Products that contain *no neutral oils, no tar bases, and practically no sulfur* are now a reality. You can count on getting phenols, cresols, xylenols, and cresylic acids of consistent high quality when you specify PITT-CONSOL.

Wherever high grade phenolic resins, esters, pharmaceuticals, detergents, disinfectants, solvents, and other end products require cresylics of unsurpassed purity and uniformity, look to PITT-CONSOL to meet these exacting needs. For more information or technical assistance, please write or call.

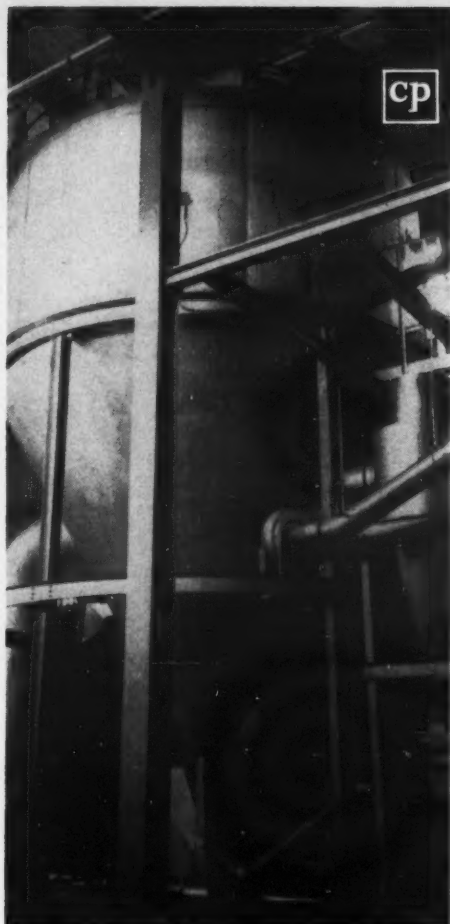


**PITT-CONSOL  
CHEMICAL COMPANY**

191 DOREMUS AVE., NEWARK 5, N. J.

A SUBSIDIARY OF PITTSBURGH CONSOLIDATION COAL CO.

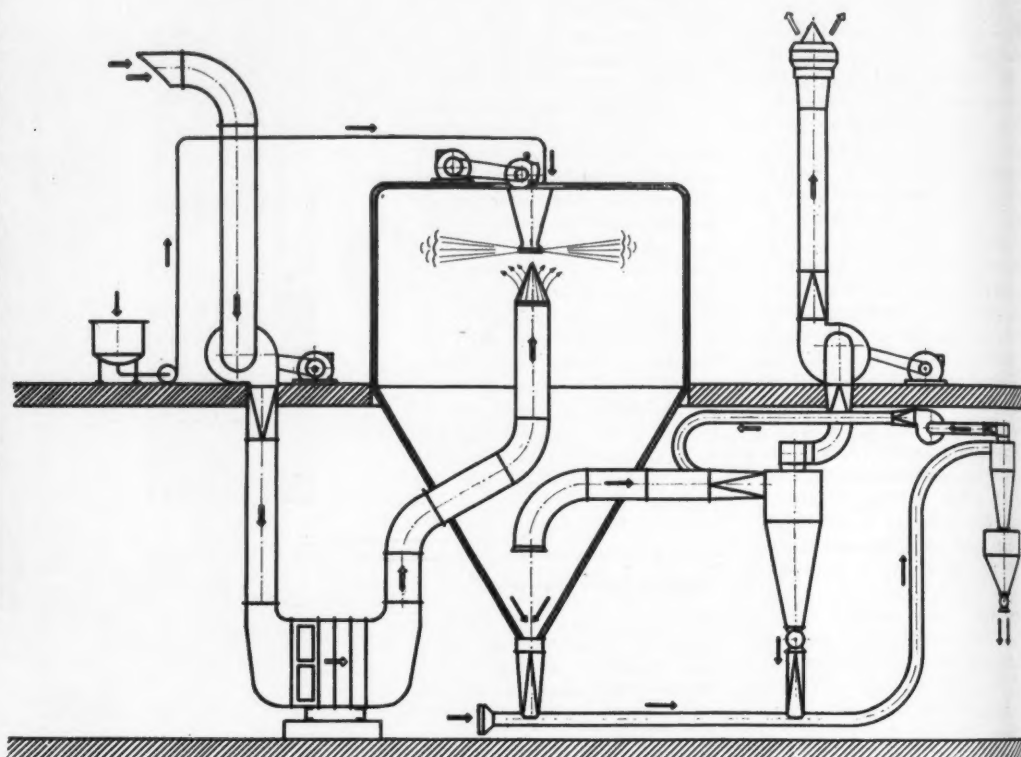
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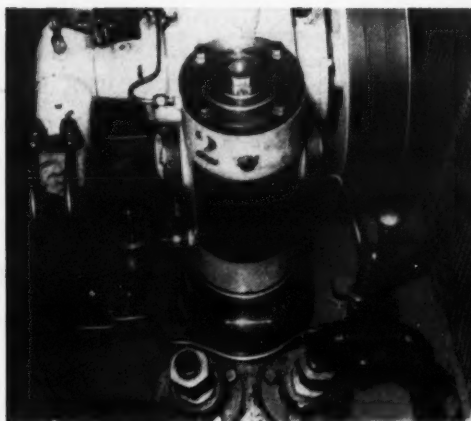
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# NEW SOLUTIONS of processing problems

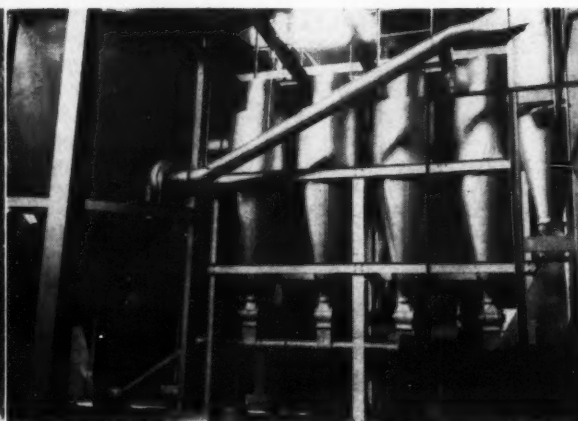
Spray dryer consists of an 18½'-diameter x 23'-high cone-shaped, insulated chamber



Simplified sketch shows spray drying system used for sulfite liquor processing



Feed enters top of spray dryer through a centrifugal atomizer rotating at 13,500 rpm



Air is exhausted through series of cyclones which recover practically all of the particles that may still be present in the air stream

*Converting sulfite waste liquor into useful products is no cinch. Some of the low-pH material can cause real havoc with processing equipment. Robeson Process Company had to make a world-wide search to find the answer to its problem. Boasting the first installation of its kind in the US, they not only found the solution, but improved their product as well by . . .*

## SPRAY DRYING SULFITE WASTE LIQUORS

**TED F. MEINHOLD**  
Associate Editor  
**WITH ASGEIR RIIS**  
President  
Robeson Process Company

Spray dryer operates practically automatically, only one man being required part time to run it

**Problem:** Excessive downtime and maintenance was being experienced in drying sulfite waste liquor products at Robeson Process Company, Erie, Pa. Although satisfactory for some of the neutral and low-acid content products, the conventional rotary drum dryers used in the operation could not withstand the corrosive action of the high-acid materials. All units have to shut down 3-4 hours for repairs, 2 or 3 times per week.

With production running about 850-lb dried product per hour per dryer, this represents a loss of 5000-10,000 lb per week on each drum dryer.

Robeson obtains the sulfite waste liquor from the nearby Hammermill Paper Company pulp mill, which supplies them with about 310,000 gallons of the dilute raw material every 24 hours. The pH is about 2.5 and Robeson adjusts this as needed.

Prior to drying, the liquor is concentrated to about 50% moisture in a quadruple-effect evaporator. Dried products all have a lignin base and are sold for use as binders, dispersing agents, tanning agents, leather goods fillers, etc., depending upon pH. Materials are sold under trade names such as Powdered Super Spruce, Powdered LacTanX, C-260, S-630, and others.

**Solution:** After careful production tests and a thorough investigation both in the US and Europe, engineers decided to install a specially designed stainless steel spray dryer to dry the high-acid content products. The neu-

tral and low-acid products are handled by the old dryers.

The first of its kind for this service in the US, the spray dryer consists of a 18½'-diam x 23'-high cone-shaped, insulated chamber. Air for drying is heated in a direct-fired furnace that can use either oil or gas as fuel. The dryer and accessory equipment occupy floor space. 56 x 25 x 41' high.

Air at 485°F enters the spray dryer through a duct capped with an adjustable air disperser. The air inlet duct actually consists of three sections, one inside the other.

Heated air flows through the inner section. This section is surrounded by a layer of rock wool insulation, which, in turn, is jacketed to permit air cooling. Cooling is accomplished by circulating a small portion of the incoming air (about 4-5%) through the jacket.

This arrangement, combined with the central location of the air disperser, provides for close temperature control of all of the dryer's interior surfaces. The temperature is held within plus or minus 5°F of the exhaust air temperature — normally about 240°F. The triple-section duct design also minimizes possibility of thermal damage to heat-sensitive products.

The dryer can handle 30-34 tons (50% moisture) feed per 24 hours, producing about 15-17 tons dried (3.5% moisture) products. The liquor is fed into the top of chamber, entering directly above the air inlet through a centrifugal atomizer rotating at

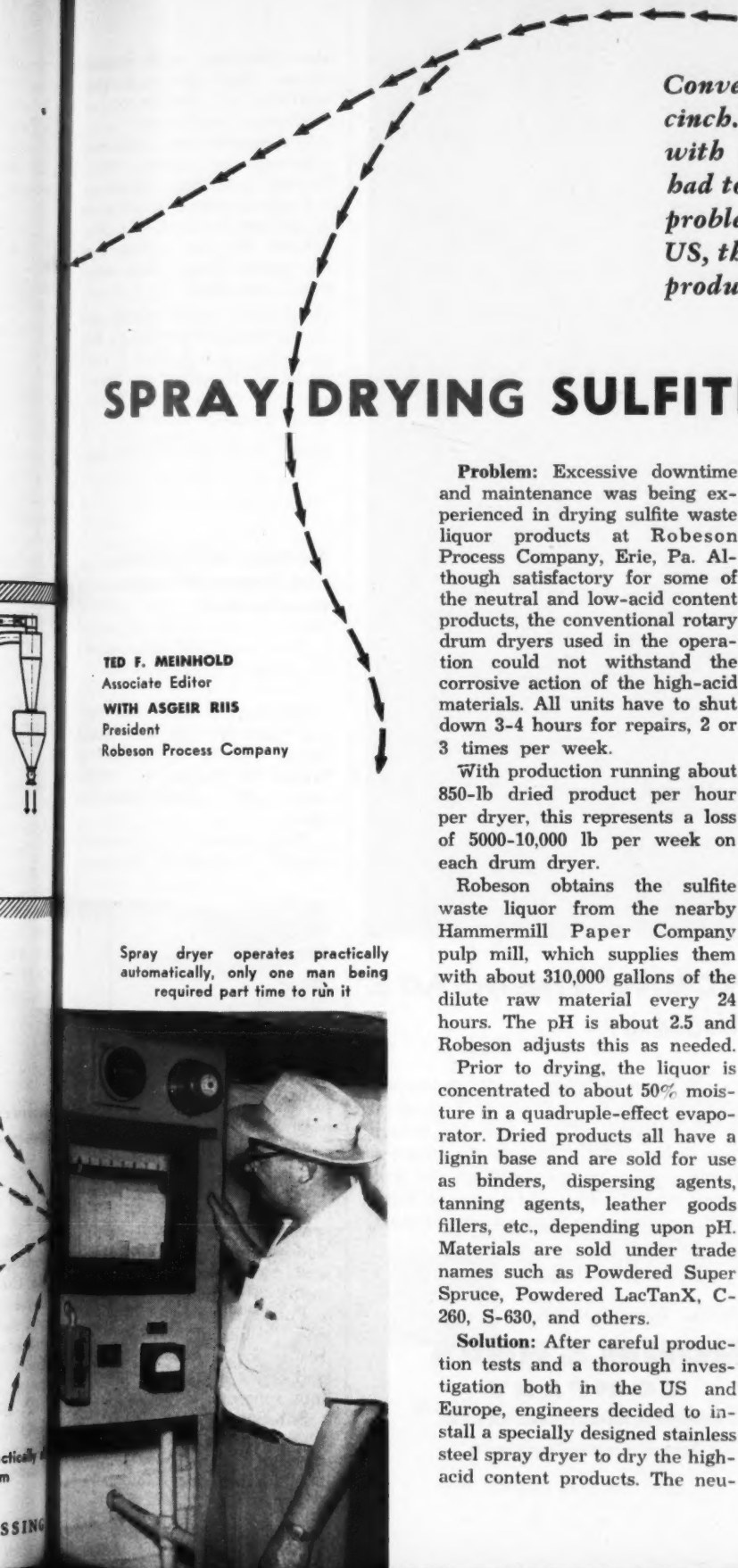
13,500 rpm (see drawing).

Air current picks up the sprayed material, deflecting it into a spiral umbrella-shaped formation. Because of the 400°F difference between the feed and the dry inlet air, drying occurs almost instantaneously as the liquor travels toward the chamber walls. All particles (micro-spheres) produced by the atomizer become non-adhesive before reaching the chamber walls.

Dried material falls freely — no air sweeps or rakes are necessary. Practically all of the product is collected at bottom of cone from which it is fed by an air-conveying system to a screw conveyor to product storage. Product temperature is about 110°F. Product retention time is only about 20-25 seconds. Air is exhausted through series of cyclones which recover practically all of the particles that may still be present in the air stream.

**Results:** Since its installation over two years ago, the spray dryer has handled the corrosive, high-acid content sulfite liquor products without difficulty. Unit operates continuously and practically automatically, only one man being required part time to run it. Because it is easy to start up and shut down, it provides versatility, making it ideal for both long and short runs.

Besides giving trouble-free operation, the unit has resulted in improved and more uniform products. The spray dried product is less hygroscopic, free flowing, and easier to handle. Over 98% of it will pass through a 100-mesh screen. Bulk density is



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SSING



styrene-acrylic modified polyester

196A

styrene-modified polyester

196C

## POLYMERS KNOW HOW TO CONCEAL THEIR AGE ...with Rohm & Haas Acrylic Monomers

Looking at these glass fibre reinforced panels, you'd hardly suspect that both were exposed to the same Florida weather for 12 months. The one, made with a styrene-modified polyester resin, suffered surface erosion, discoloration, and fibre "splintering." But the other, made with a styrene-acrylic modified polyester resin, retained its color and surface gloss without fibre evidence. This is typical of the built-in benefits you get through

copolymerization of Rohm & Haas acrylic monomers with many other monomers. The primary chemical bonds which are formed mean that the acrylates cannot migrate, volatilize, or be extracted by even the strongest solvents. As a result, copolymers remain tough and flexible longer . . . resist attack by heat and ultraviolet light. To see how acrylic monomers can improve your product, write for our detailed booklet.

### ROHM & HAAS ACRYLIC MONOMERS

Methyl acrylate	Butyl methacrylate
Ethyl acrylate	Hexyl methacrylate
Butyl acrylate	Decyl-octyl methacrylate
2-Ethylhexyl acrylate	Lauryl methacrylate
Methyl methacrylate	Stearyl methacrylate
Ethyl methacrylate	Glacial acrylic acid



Chemicals for Industry  
**ROHM & HAAS  
COMPANY**

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Check 2455 opposite last page.

## NEW SOLUTIONS

about 34 lb per cu ft. Because of the close control possible with the unit, particle size can be changed as desired.

The system has a collecting efficiency of about 99.8%. Thermal efficiency is high too.

Fuel requirements are about 16 gallons fuel oil (No. 3 - 141,000 Btu per gallon) per ton sulfite liquor (50% moisture) processed.

(Nerco-Niro spray drying system is product of Nichols Engineering and Research Corporation, Spray Dryer Division, 70 Pine Street, New York 5, New York.)

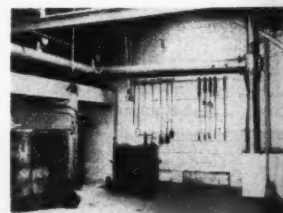
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### Scrubber ends nuisance and danger of fumes from varnish

Unit performs economically without maintenance

**Problem:** Fumes from boiling varnish oils and alkyd resins had to be stopped at Walter N. Boysen Co., Oakland, Calif., varnish manufacturer.

Two reasons company wanted to eliminate the fumes



Fume scrubber (right), at Walter Boysen Co., completely and successfully eliminates dangerous, annoying fumes generated during varnish "cooking"

were to comply with intensified antipollution ordinances and to promote good community relations.

Fumes came from four varnish "cooking" kettles where resins are reacted with oils and other ingredients in various solvents.

**Solution:** Fumes from varnish kettles were vented through telescoping fume hoods and a duct system, to a

## NEW SOLUTIONS

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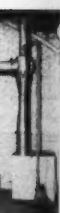
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12-inch fume scrubber. As they enter scrubber, fumes consist of liquid particles and gases.

A water jet knocks down liquid particles. Condensable fumes are removed in quantities up to their vapor pressure level at the discharge temperature.

Non-condensable fumes are absorbed by scrubbing liquid and the discharge is made into a separator located at base of unit.

System handles 1000 cfm of gas. Water for scrubbing jet is recirculated through system by a 140-gpm pump operating with a 120-ft head.

Only operating cost is for water and power required for pump.

Atomizing nozzles are used at each junction of collecting lines and main suction lines to prevent any possibility of flame propagation between adjacent kettles.

**Results:** Practically all fumes from varnish manufacture have been successfully eliminated and community relations considerably improved. System is maintenance free and economical.

(System was supplied by Schutte and Koerting Co., Cornwells Heights, Bucks County, Pennsylvania.)

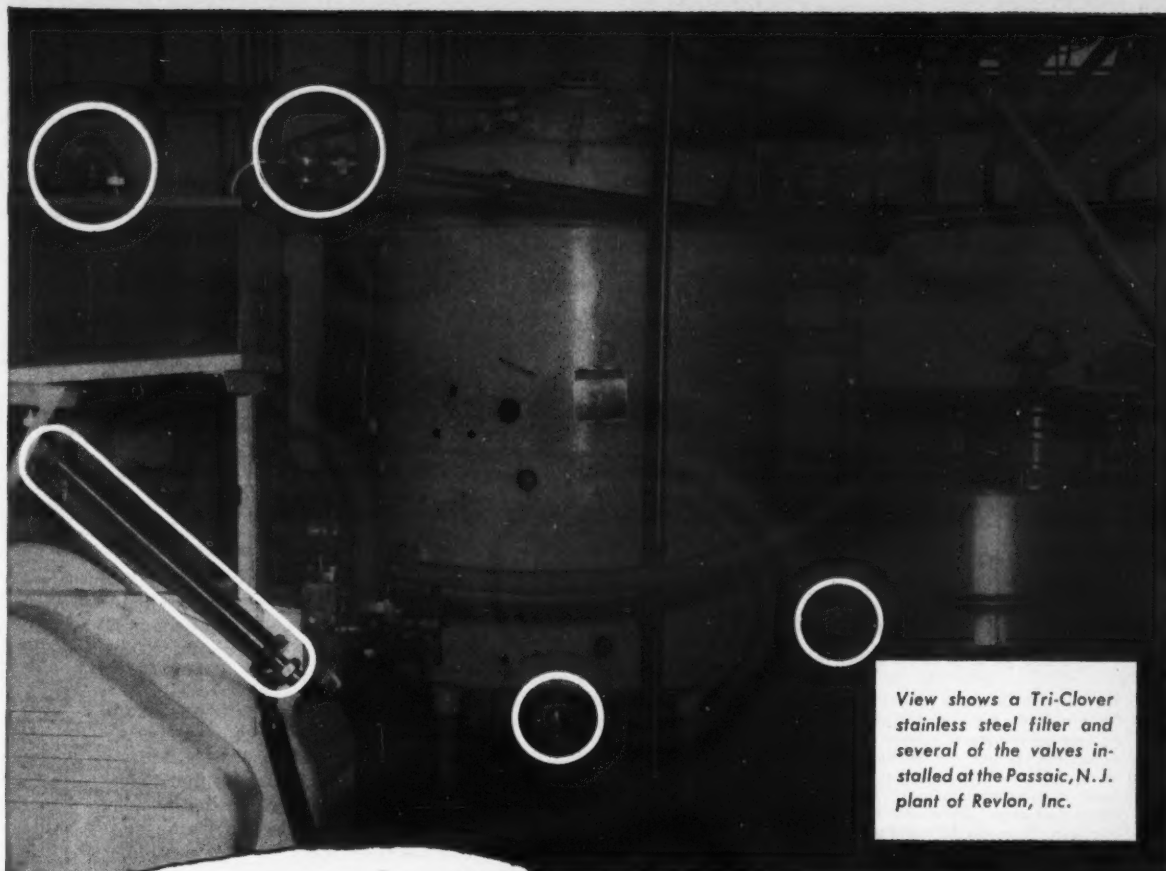
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### FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service slip opposite last page of this issue. Fill in slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.



View shows a Tri-Clover stainless steel filter and several of the valves installed at the Passaic, N.J. plant of Revlon, Inc.



**LADISH CO.**

*Tri-Clover Division*  
Kenosha Wisconsin

TRI-CLOVER

I-157

EXPORT DEPT.—8 So. Michigan Ave., Chicago 3, U.S.A.

Cable: TRICLO

IN CANADA—Brantford, Ontario



**REVLON**—"the greatest name in cosmetics" has established an enviable reputation for highest quality products in the field of cosmetics and beauty preparations.

In the modern and efficient Revlon plant at Passaic, N.J., are numerous Tri-Clover Division stainless steel fittings, valves, and filters, all helping to protect the inherent high quality of hand creams and lotions bearing the famous Revlon label.

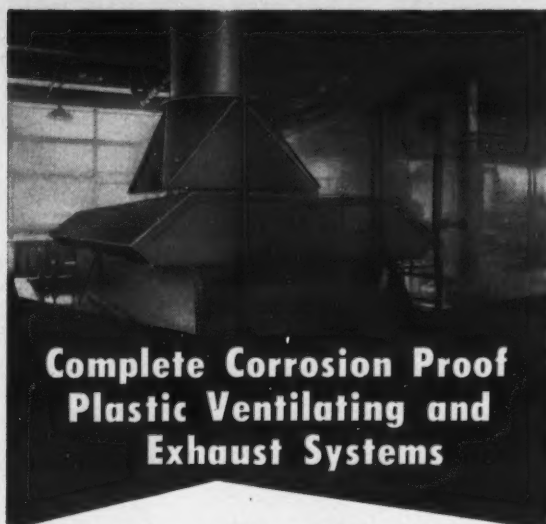
This is but one example of the way in which sparkling-clean Tri-Clover stainless steel fittings, valves, pumps, tubing and specialties are used in the chemical-process industries to assure the utmost protection against corrosion and product contamination.

Our experienced engineering service is at your disposal to help solve your specific corrosion-resistant piping problems.

See your nearest **TRI-CLOVER Distributor**

See the **TRI-CLOVER Division Exhibit** at the  
**1957 CHEMICAL SHOW**

Check 2458 opposite last page.



## Complete Corrosion Proof Plastic Ventilating and Exhaust Systems

**...engineered and built to  
specifications, save  
maintenance dollars  
...cut downtime.**

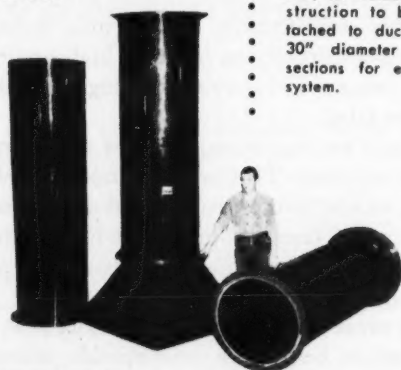
■ Wherever corrosive fumes must be handled, Agilide (PVC) or Agilene (polyethylene) exhaust and ventilating systems will do the job at far less cost. Made entirely of rigid and durable plastic, they afford complete protection from corrosion. There are no coatings to chip or peel — no weak spots and no metal parts to corrode.

Agilene (polyethylene) and Agilide (PVC) installations are widely used in the chemical and allied industries. They quickly pay for themselves by outlasting previously used materials.

Write for full details on Agilene and Agilide corrosive resistant exhaust systems . . . there are components to cover all phases of fume ventilation from the exhaust hood — to fan — to the weather cap above the roof.



Double lateral exhaust ducting of 6 1/2" O.D. Agilene material, all welded construction to be attached to duct line. 30" diameter stock sections for exhaust system.



Acknowledged pioneers in the engineering and welding of structural plastics.

**AMERICAN AGILE Corp.**

5461 Dunham Rd. • Maple Heights, Ohio

Check 2459 opposite last page.

## NEW SOLUTIONS of processing problems

While reducing breakage of filter cloth, and saving labor—cellulose-bonded, nonwoven fabric made from rayon fibers, used with plate and frame filters —

## produces filtered product of higher clarity

GORDON WEYERMULLER, Associate Editor

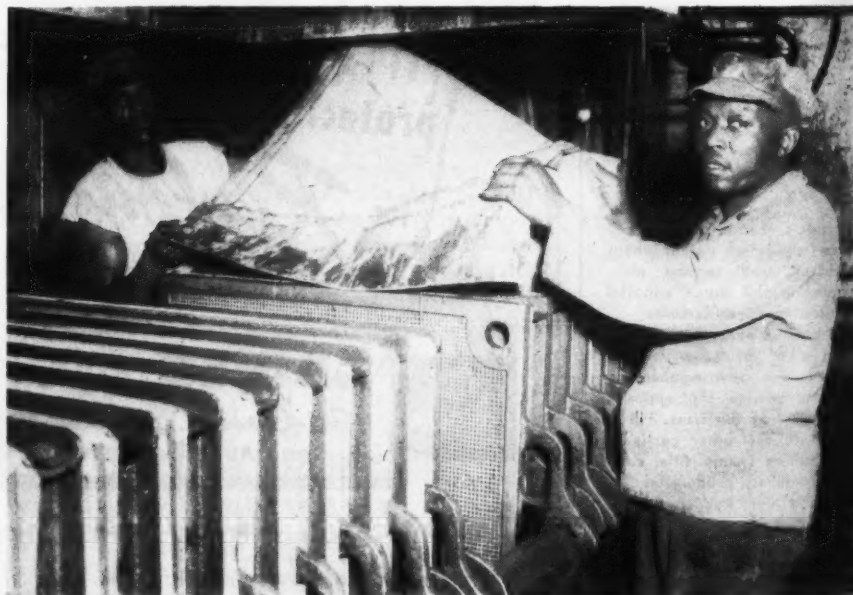
With O. D. EASLEY, Superintendent, Memphis plant  
And J. H. BRAUNER, Chief Engineer  
Southern Cotton Oil Division  
Wesson Oil & Snowdrift Co., Inc.  
New Orleans, Louisiana

At the Memphis plant of Southern Cotton Oil, a nonwoven fabric, called Viskon, which is used with plate and frame filter presses, has been found to offer a number of advantages, one of the most important of which being the higher product purity obtained. The nonwoven fabric is not used by itself, but along with conventional filter cloth. Filter cloth is first put on the plates and used as a backing for the nonwoven fabric. Fabric does the filtration and the cloth acts as a support.

At Memphis, the nonwoven fabric — made from rayon fibers bonded with cellulose — is used over No. 8 duck. With this procedure, cottonseed oil is produced which contains 0.05% or less gasoline insoluble solid. The Memphis plant used 9780 square yards of the nonwoven fabric this past season at a cost of 6c per ton of cottonseed crushed.

This cost is more than justified by the higher clarity of the product and

To page 64



Nonwoven fabric being installed on a filter plate at the Memphis plant



## Data Savers!

CHEMICAL PROCESSING'S Processing and Engineering Data section is for you!

Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations.

Perhaps you will find them to be of value to you. A wide variety of information can be found in this section. So, no matter what your particular field, you will find suitable data to aid you in your daily work.

### And —

the section pages are designed to fit easily into your data files:

Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebooks.

### So —

be sure not to miss this month's "Data" Section.

It begins on page 67.

For more information on product at right, specify 2460 see information request blank opposite last page.



# VERSATILE POLYMER

# PVP

(polyvinylpyrrolidone)

PVP is a synthetic, high-molecular-weight polymer with a remarkable variety of properties.

It is a binder, stabilizer, detoxifier, disperser, and film former, and is physiologically acceptable.

## HERE ARE SOME OF THE AREAS IN WHICH PVP IS IMPROVING PRODUCTS AND PROCESSES

**Detergents:** Prevents soil redeposition, controls color bleeding, and reduces irritation.

**Lithography:** Colloid for diazo and dichromate sensitizers. Excellent post-etch. In fountain solution, helps keep cloth rollers clean.

**Paints:** Improves pigment dispersion and film leveling. Makes possible use of dyes to obtain new colors and shades.

**Waxes and Polishes:** Improves luster, cleansing action, flow, and wetting.

**Cosmetics:** In hair preparations, PVP improves hair management. Acts as a detoxifier. Stabilizes lathers in shaving preparations and emulsions in skin cleansing products.

**Pharmaceuticals:** Minimizes toxic side effects of many drugs. Prolongs drug action and increases effective blood level. Acts as suspending agent in liquids and binder in tablets.

**Beverages:** Removes chill haze and acts as a clarifying agent by complexing with and precipitating tannins in beer, wines and fruit juices.

**Adhesives:** Gives stable dispersions of vinyl adhesives and superior adhesion.

**Paper:** Produces better pigment dispersions, smoother coatings. Improves wet strength and ink receptivity.

**Inks:** Better gloss and pigment dispersion. Increases solubility of dye-stuffs and prevents gelation. Can improve ball-point inks, type-writer ribbons and carbon papers.

**Textiles:** Prevents flocculation of titanium dioxide in delustering of synthetic fibers. Adaptable as warp size for acetate and viscose. Improves other sizes. Improves dye receptivity of hydrophobic fibers. Dye scavenger in print washes.

**Glass:** Gives outstanding adhesion to glass surfaces. Acts as a glass fiber forming size for increased strand strength.

There is a lot more to know about PVP. Write for complete information on this versatile chemical.



*From Research to Reality*

ANTARA



ACETYLENE CHEMICALS DEPARTMENT

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*B*ecause much of the initial research on gas (ethylene oxide) sterilization originated at American Sterilizer, growing numbers of AMSCO-developed installations have been serving production and processing industries for more than eight years.

*H*ere, as in the traditional Pressure Steam or Dry Heat methods, the American Sterilizer Company offers the world's largest accumulation of facilities, experience and research data on the broad subject of sterilization.

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GAS



PRESSURE  
STEAM



DRY HEAT

## NEW SOLUTIONS

### Viskon Filter Cloth

From page 62



Filter press using nonwoven fabric in operation at the Memphis plant of Southern Cotton Oil

labor saved in cleaning presses.

Labor costs are reduced because the nonwoven fabric builds a firm, dry cake that drops off easily when the press is cut for cleaning. It requires no scraping and needs only to be wiped off around the edges with a rag cloth for good re-seating of the filter press plates. Filter presses used are 36" plate and frame units,

#### Typical Viskon nonwoven fabric

Type	SFR-850
Width	36 to 48"
Weight	1.95 oz/yd <sup>2</sup>
Porosity	135 cfm/H <sup>2</sup>
Particle retention	
in air	40 microns
Water flow	20 gpm/H <sup>2</sup>

each having 22 three-inch frames. Plant started using the nonwoven fabric the latter part of the 1954 season.

Use of nonwoven fabric reduces breakage of conventional filter cloth and greatly prolongs its life. Fabric also permits use of lighter canvas or duck since the nonwoven fabric does the filtering and the canvas is used only as a backing for strength.

Southern Cotton Oil has also found that with the nonwoven fabric, the troublesome washing procedure — which goes along with filtration of crude vegetable oil containing traces

## NEW SOLUTIONS

of gelatinous protein material — is practically eliminated. In addition, it is no longer necessary to precoat the press prior to filtration — resulting in additional savings in time and labor.

### Advantages

Nonwoven fabric is easy to cut and holes can be readily inserted. Several complete filter sets can be made up in a short period of time. Fabric is draped over press in the same manner as is canvas.

Nonwoven fabric comes in a variety of weights and can be custom-produced to specifications. It is available in 1000-yard rolls. Fabric is stronger than paper and particles cannot become imbedded in it as in woven cloths. It is non-toxic, easily cleaned and insoluble in all common organic and inorganic solvents. Other products with which it is used include antibiotics, paints, pigments, coolant oils, viscose and acetate, molasses and other food products.

(Viskon nonwoven fabric is product of Chicopee Mills, Inc., 47 Worth St., New York, N. Y., produced in their plant in Little Rock, Ark.)

Check 2461A opp. last page.

### Dry ice and alcohol solve nuclear reactor maintenance problem

Freezes 'hot' water to permit removal of defective part

**Problem:** The seal mechanism on one of the control rods of Argonne National Laboratory's EBWR — Experimental Boiling Water Reactor (see *CHEMICAL PROCESSING*, April 1957, pages 14-15) — was not functioning properly. This prevented routine maintenance from being conducted on the reactor's control rod drive mechanism. Removal of the seal mechanism would result in radioactive water leaking out of the nuclear reactor's core.

Of course, the core could be drained completely. This,

**don't wait for a  
SERIOUS  
ACCIDENT**

Install a  
**"NECO"**  
SAFETY  
TANK CAR PLATFORM

Model NECO-2A is outfitted with lights, access ladder, incorporates piping.



**Eliminate dangerous hazards of working on slippery tank car tops. Avoid costly, heartbreaking accidents. Protect your employees — make them more efficient.**

Custom built vertically adjustable platforms available in a range of prices. Hydraulically or manually operated. Write for pictures, specifications, information.



**NICHOLS ENGINEERING CO.**  
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SERVING INDUSTRY SINCE 1894

Check 2461B opposite last page.

## PARTIAL LIST OF USERS OF "NECO" SAFETY TANK CAR PLATFORMS

E. I. DuPont deNemours & Co., Inc.\*  
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(E. R. Squibb & Sons Divn.)  
New York Central Railroad Co.\*  
Procter & Gamble Co., Can., Ltd.  
U. S. Atomic Energy Commission  
United States Rubber Co.\*  
Upjohn Company  
Chas. Pfizer & Co., Inc.  
Celanese Corp.  
Chesapeake & Ohio R.R. Co.  
Bethlehem Steel Corporation  
American Can Company\*  
Allied Chemical & Dye Corp.  
Air Reduction Chemical Company  
Kaiser Steel Corporation

\*Several locations



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- COMPLETE RELIABILITY
- NO OPERATING COST

Available with these custom features:

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REMOTE SCANNING  
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Send for Bulletin 301.


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Optical CORPORATION  
NORTHAMPTON, MASSACHUSETTS

Check 2462 opposite last page.

# "Alamask"

SPECIALLY DESIGNED ODOR CONTROL CHEMICALS  
FOR MALODORS TRACEABLE TO

P.V.A.  
PHENOLS  
P.M.A.  
PLASTISOLS  
SULFHYDRATES

Alamask odor control chemicals reduce the intensity of a wide variety of obnoxious malodors such as these, found in both processing operations and finished products. Rhodia's technical engineers will offer specific recommendations to solve your odor problems. Samples and directions for use are available upon request.

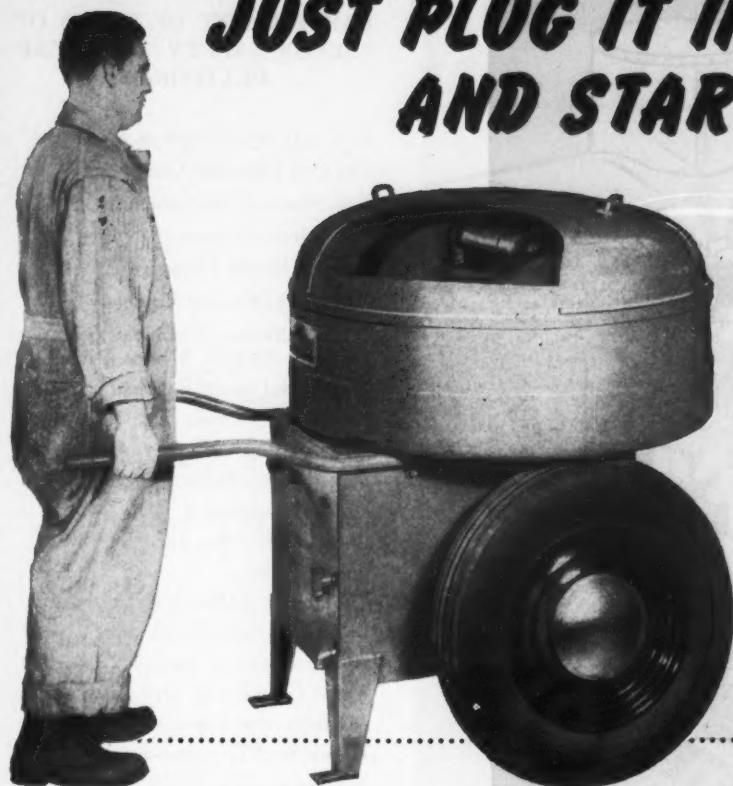
**Rhodia INC.** 60 East 50th St.  
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Check 2462A opposite last page.



# JUST PLUG IT IN... AND START MULLING



## SIMPSON Porto-Muller

Low Cost  
100% portable  
Self-contained  
Versatile  
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PREPARE THESE PRODUCTS BETTER,  
FASTER AND AT LESS COST  
WITH THE PORTO-MULLER

Abrasives • Adhesives • Animal Feeds •  
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**POSITIVE MIXING ACTION.**  
Spring-loaded mullers per-  
mit easy adjustment of mull-  
er pressure—permits use of  
lightweight mullers, lets you  
adjust pressure to mull any  
material.



**FAST, SIMPLE DIS-  
CHARGE.** Just open the  
large bottom door and  
plows do the work. Door  
located at proper height  
for wheelbarrow. Auto-  
matic discharge makes  
unit self-cleaning.



The Simpson Porto-Muller is designed to fill a real need for a low cost—high efficiency muller in the  $2\frac{1}{2}$  to  $3\frac{1}{2}$  cubic ft. batch capacity range for the proper preparation of dry, wetted or plastic materials. As such, it is preferred for pilot plants and small production requirements. It's a versatile, efficient and completely self-contained mixer "package". With it you can duplicate the same high quality of mixing; realize the same mixing economies and be assured of the same rugged construction that has made the name Simpson Mix-Muller a standard of mixing quality for over 45 years.

Look at the products you can mix... appraise the outstanding features of this low cost mixer. Write for details on a free mixing report on your product. There is no obligation and remember...

MIXING AND THE INTEGRATION OF MIXING EQUIPMENT  
—IS OUR BUSINESS!



### SIMPSON MIX-MULLER® DIVISION

National Engineering Company  
640 Machinery Hall, Chicago 6, Illinois

## NEW SOLUTIONS

however, would take about 6 full days of around-the-clock work, since it involved removing fuel elements, draining water, and reloading core. New way of blocking release of "hot" water was needed.

**Solution:** Argonne engineers theorized that a mixture of dry ice and alcohol could be applied to the part in question, freezing it and providing an ice dam for a protective shield. With a shield, maintenance could be done.

A 2" deep mixture, at temperature of  $-70^{\circ}\text{F}$ , was applied between a flange and a steel retainer plate that provides structural retainment for parts of the mechanism. Mixture was applied for 5 hours.

Flange was loosened, and there was no leakage. Flange was removed and examination showed that 10" of ice had formed, more than enough for protective shielding. Mechanism could now be removed.

**Results:** The parts were cleaned, repaired, and reinstalled. The ice thawed and machinery was ready for operation within 8 days from the start of the project.

The freezing experiment proves that planned maintenance for nuclear reactors can be carried out safely, according to Argonne officials. They point out that this type of maintenance is typical and necessary for all types of reactors. Unless maintenance of this type can be done, no reactor can be operated safely.

(Additional information on reactor maintenance technique can be obtained from Argonne National Laboratory, PO Box 299, Lemont, Illinois.)

## Industry Leaders Discuss 1958

... and what technological and business developments they expect the year to bring to their particular industry. Top men from chemical, petroleum, petrochemical, and other allied industries will be presented in this January CHEMICAL PROCESSING feature.

## New uses found for Metallic Oxide Pigments

Today new product planners and production engineers are finding uses for the unique physical and chemical properties of metallic oxides which are surprisingly far afield from traditional usages.

Below is a review of their characteristics. Look them over. You may get the germ of an idea which will lead to the improvement of existing products . . . or to the reduction of new product manufacturing costs.

We'll be glad to cooperate with you in exploring the possibilities. Address Dept. 75, C. K. Williams & Co., Easton, Penna.

Name	Properties
Pure Red Iron Oxides and Kroma Reds	Fe <sub>2</sub> O <sub>3</sub> -98.5% SpG.-5.15 Color—Salmon to purplish red
Pure Yellow Iron Oxides	Fe <sub>2</sub> O <sub>3</sub> .H <sub>2</sub> O-99% SpG.-4.03 Color—Lemon to dark orange
Pure Black Iron Oxides	Fe <sub>3</sub> O <sub>4</sub> -96% min. SpG.-4.96 Color—Blue Black
Pure Chromium Oxides (and Hydrates)	Cr <sub>2</sub> O <sub>3</sub> -99% SpG.-5.20 Color—Light to dark green
Natural Oxides—Ochers, Umbers, Siennas, Metallic Browns, Red Oxides	Wide range of ferric oxide content and red, yellow and brown colors
Venetian Reds	Fe <sub>2</sub> O <sub>3</sub> -40% SpG.-3.45 Color—Light to med. red
Cuprous Oxide	Cu <sub>2</sub> O-97% min.
Extenders—Barytes, Calcium Carbonate, Calcium Sulfate, Silica	Wide range

### Characteristics

**Composition:** The basic colors of the iron and chromium oxides are determined by chemical composition. Reds are ferric oxide (Fe<sub>2</sub>O<sub>3</sub>); yellows, hydrated ferric oxide (Fe<sub>2</sub>O<sub>3</sub>.H<sub>2</sub>O); blacks, ferro-ferric oxide (Fe<sub>3</sub>O<sub>4</sub>); and greens, chromic oxide (Cr<sub>2</sub>O<sub>3</sub>). All these compounds are chemically stable and light permanent.

**Particle Shape:** Physical properties such as oil absorption and suspension characteristics are dependent on particle shape, controlled by manufacturing processes.

**Size:** Color range is controlled by particle size—average size increases as color darkens. Uniformity of size determines brightness.

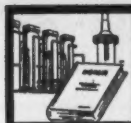
**Purity:** Freedom from impurities is essential for superior pigment properties and to prevent deleterious effects in end-products. Control of soluble salts, manganese and copper content are an important part of the Williams manufacturing operation.

**WILLIAMS**  
COLORS & PIGMENTS

**C. K. WILLIAMS & CO.**

East St. Louis, Ill.

Easton, Penna. • Emeryville, Calif.



processing and engineering data

## How to Make Nomographs – IV

### Multiplication and Division Charts, Parallel and Logarithmic Scales

D. S. DAVIS

Head, Department of Pulp and Paper Technology  
University of Alabama

Nomographs that consist of parallel logarithmic scales for multiplication and division are most common. Consider the equation

$$V = 45D^2(\delta - 1)$$

where, for mineral grains falling freely through water,

V = velocity of fall, 5 to 100 cm/sec

D = diameter of mineral grain, 0.3 to 0.9 mm

δ = specific gravity of mineral, 2.0 to 4.0

Space parallel axes, say, 16.5 cm apart, as in Figure 4 on page 69. Since the operation is one of multiplication, arrange all scales to increase in the same direction. Choose 50/2 cm as the modulus for logarithmic D scale and construct scale (50/2) 2 log D or 50 log D on axis at left by means of 50-cm logarithmic scale on modulus chart presented on page 73 of August issue of *CHEMICAL PROCESSING*.

Choose 50 cm as modulus for δ scale, and construct scale 50 log (δ-1) on axis at right, centering this scale with respect to D scale, solely for appearance. Since the moduli for D and δ are 25 and 50 cm, respectively, V axis will lie between D and δ axes at a distance of

$$\frac{25}{25 + 50} (16.5) \text{ or } 5.5 \text{ cm from D axis. Find}$$

modulus for V scale by multiplying moduli together and dividing by their sum, or

$$\frac{(25)(50)}{25 + 50} = 16\frac{2}{3} \text{ cm.}$$

Find a starting point for V scale by aligning D = 0.4 and δ = 2.0 and marking intersection with V axis. Find value of V at this point by substituting in the equation to achieve

$$V = 45 (0.4)^2 (2.0 - 1.0) = 7.2$$

Fold the modulus chart along 16-2/3-cm line and match up 7.2 on this scale with intersection of V axis just found. Then graduate V scale as shown in Figure 4. Had the operation been one of division, as

$$V = 45 D^2 / (\delta - 1.0),$$

D and δ scales would have been laid off to increase in opposite directions, and V and D scales would have continued to increase in the same direction.

For a more complete treatment of multiplication and division charts that employ parallel logarithmic scales, fortified with underlying theory and extended to include four and five variables, see author's "Nomography and Empirical Equations," Chap 6, Reinhold Publishing Corp., New York, 1955.

### ERRATA

In the second installment on series "How to Make Nomographs," which appeared on page 81 of the October *CHEMICAL PROCESSING*, the following corrections should be noted:

Line	For	Should Read
20	3/75.8	(3/75.8)75.8V
27	or cm long	or 24 cm long
48	0.00518	0.00518 cm

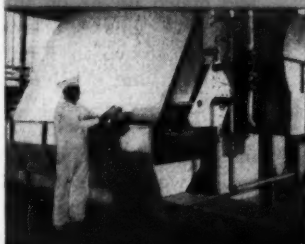
## CUSTOM DESIGNED FILTRATION

Get the last ounce of efficiency, at no extra cost  
...it adds up to big savings

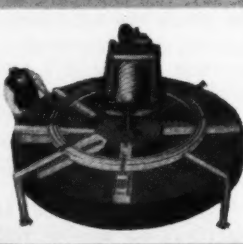
When your filter runs hour after hour...month after month...  
a few points extra efficiency soon pays back the cost of the finest machine you can buy.

There's only one sure way to get this last ounce of efficiency:  
*custom design*. In all types of rotary vacuum filters, FEinc's *custom design* has  
consistently delivered whatever is required. Whether you want  
higher recovery of valuable solubles with less dilution...lower impurities in  
finished cake...2-6% less moisture...or just higher output  
in limited floor space...FEinc can deliver. We'll be happy to conduct complete  
tests and submit recommendations. No obligation. Write today.

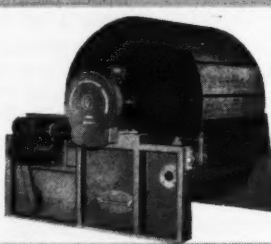
This FEinc String Filter replaced 2  
presses and 6 men



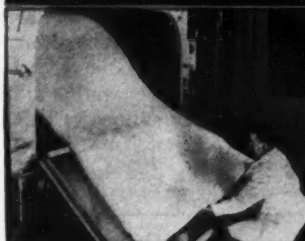
FEinc Horizontal Filter is fastest,  
simplest for free filtering jobs



FEinc Scraper Filters are tailor-made  
for each specific job



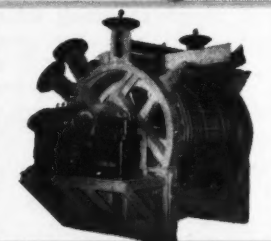
FEinc penicillin filter enclosed for  
steam sterilization



FEinc Roller-Discharge handles  
slimy materials



FEinc top-feed unit, showing unusual  
drum design



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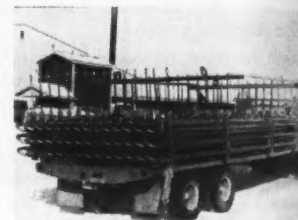
*Custom designed continuous filtration*

Check 2465 opposite last page.

## NEW SOLUTIONS

### Ammonia and sea water resisted by duplex tube

**Problem:** Cooling coils for ammonia had to withstand not only ammonia inside but a cold sea water spray on the outside. They were to be used as primary and secondary condensers at anhydrous am-



Completed condenser coil of 14  
parallel banks of six passes each

monia plant of Northern Chemical Industries, Searsport, Me. Condensers consist of one section with 14 parallel banks of six passes each and a section of 14 parallel banks of 10 passes each.

**Solution:** Based on cost and corrosion resistance, a duplex tube was chosen: steel clad with the copper alloy — for resistance to ammonia; Arsenical Admiralty — for resistance to sea water.

Nearly a mile of tube was used to fabricate coils. Copper cladding is 2.030" OD x 0.065" wall thickness.

Alloy Composition	%
Component	
copper	71
zinc	28
tin	1
arsenic, antimony or phosphorous	trace

**Results:** Duplex tube combines lowest cost with greatest resistance to corrosion from ammonia and sea water. Engineers estimate service life to exceed eight years.

(Coils were supplied by Portland Copper and Tank Works, Portland, Me.)

Check 2466 opposite last page.

(Further information about copper may be obtained from Copper & Brass Research Association, 420 Lexington Ave., New York 17, N.Y.)

Check 2467 opposite last page.

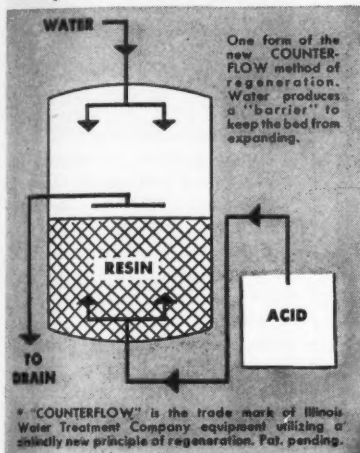
CHEMICAL PROCESSING



# ILLCO-WAY

## ionXchange

### COUNTERFLOW\* REGENERATION OF ION-EXCHANGERS



- Ion leakage is reduced to about 1/3 of the amount common to conventional regeneration techniques.
- There is an increase of approximately 10% in cation resin capacity, with no increase in amount of acid regenerant.
- Removal of organics from the resin is improved.
- The possibility of calcium sulfate precipitation is decreased, permitting single-stage regeneration.
- Rinse water requirements are reduced.
- In systems using a two-bed deionizer ahead of a mixed-bed unit, ions can be removed more completely in the more efficiently regenerated two-bed unit, thereby reducing the load on the mixed-bed unit.

Present users of "COUNTERFLOW" are enjoying IMPROVED purity of effluent at LOWER cost of regenerant materials. One power plant, for example, is saving \$16,000 a year on acid alone since converting existing de-ionizers to COUNTERFLOW design.

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ILLINOIS WATER  
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Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.  
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.

Check 2468 opposite last page.

DECEMBER 1957



## processing and engineering data

### How to Make Nomographs - IV From page 67

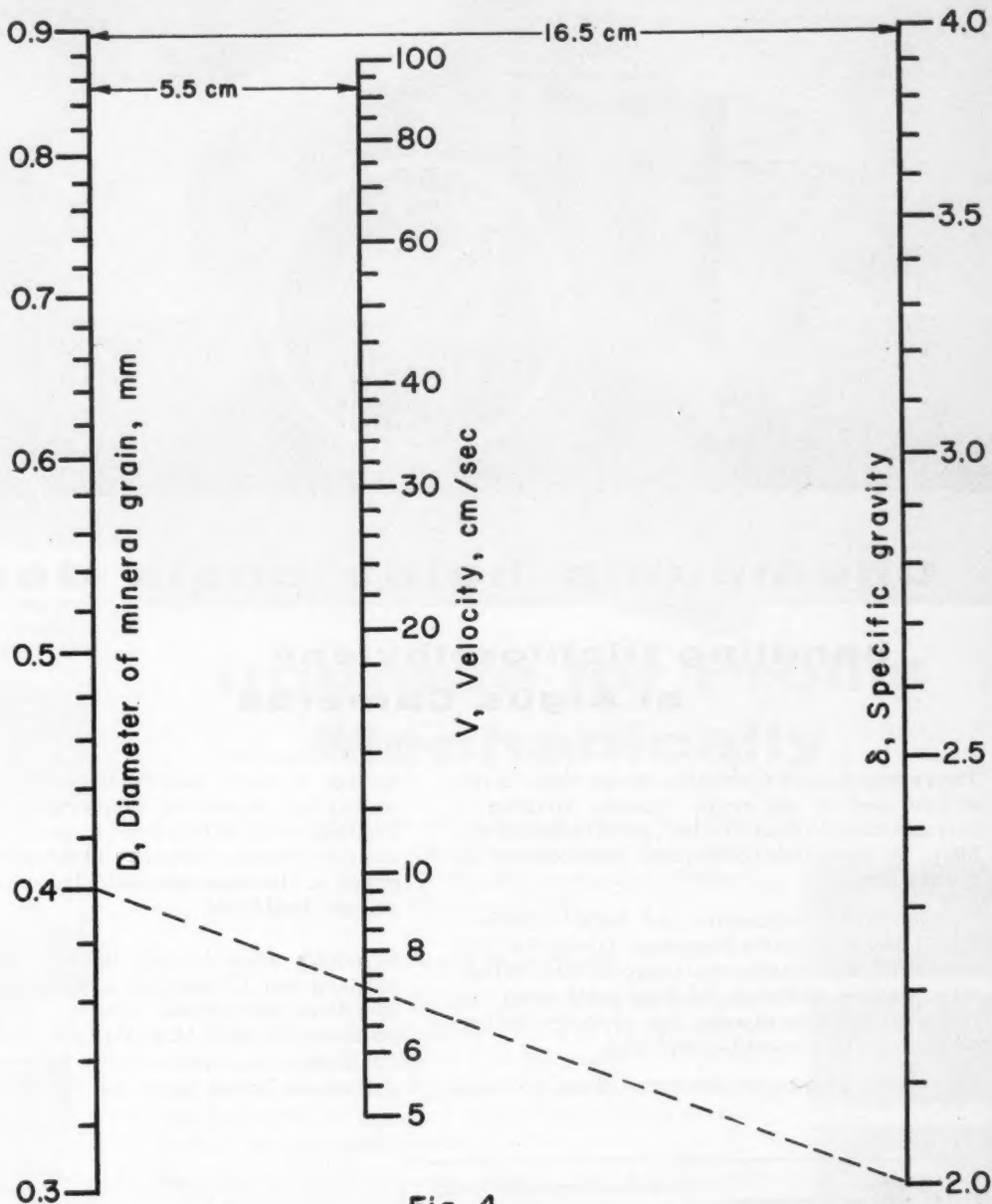
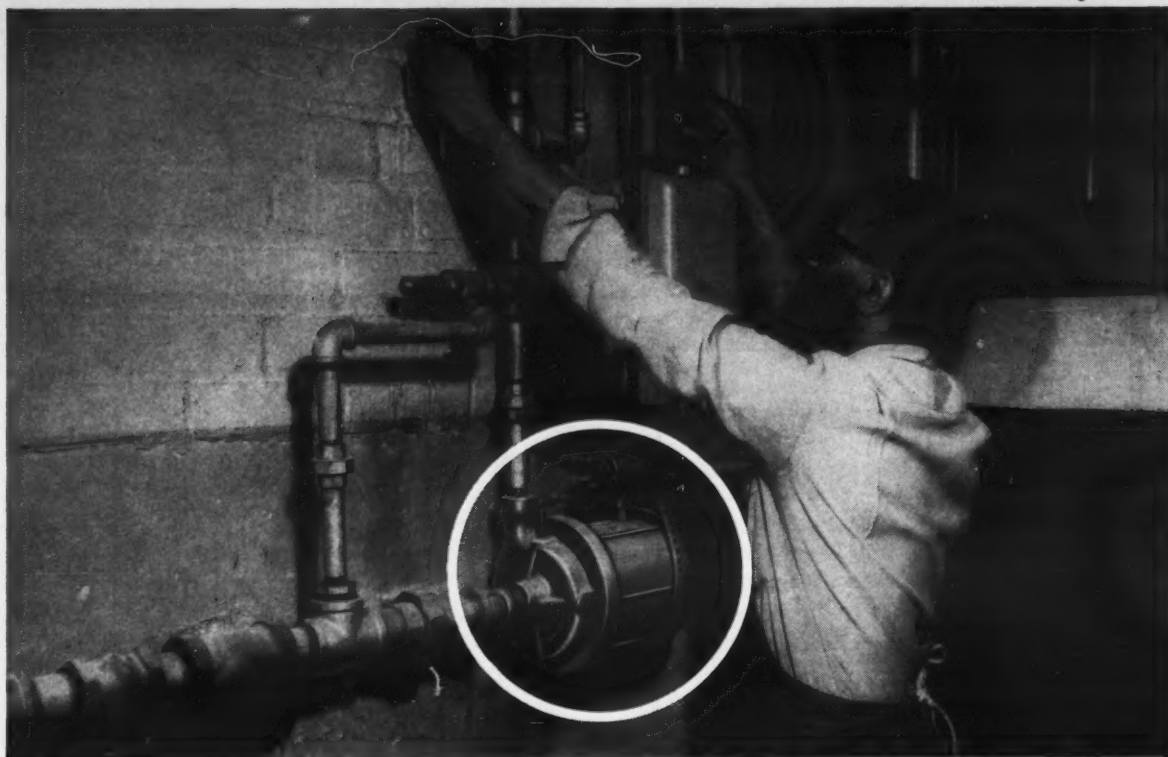


Fig. 4



## Chempump holds costs down handling trichlorethylene at Argus Cameras

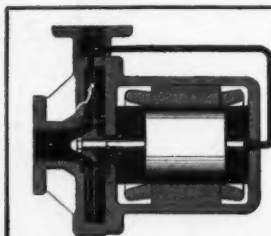
The explosion-proof *Chempump* shown above is one of two used at the Argus Cameras Division of Sylvania Electric Products, Inc., plant in Ann Arbor, Mich. to move trichlorethylene from storage to holding tanks.

Trichlorethylene—expensive and highly volatile—is used here at Argus for degreasing. It's hard to hold—seeps through conventional pump packing and dissolves packing lubricants. Leakage could mean continual maintenance expense, loss of costly trichlorethylene, and the hazard of explosion.

For Argus, *Chempump* eliminates these problems

because it can't possibly leak—has no seals, no stuffing box, no packing. Simplicity of design reduces maintenance to an occasional inspection and replacement of bearings. External lubrication is never required . . . bearings are constantly lubricated by the pumped fluid itself.

You have much to gain through leakproof fluid handling with *Chempump* in your own processing operations. For details, write to Chempump Corporation, 1300 East Mermaid Lane, Philadelphia 18, Pa. Engineering representatives in over 30 principal cities in the United States and Canada.



*Chempump* combines pump and motor in a single, leak-proof unit. No shaft sealing device required.

U.L. approved. Available in a wide choice of materials and head-capacity ranges for handling fluids at temperatures to 1000 F. and pressures to 5000 psi.

**Chempump**

First in the field...process proved

Check 2469 opposite last page.

## NEW SOLUTIONS

### Corrosive plasticizers held successfully by aluminum

Storage tanks save money  
on maintenance

**Problem:** Corrosive nature of plasticizers used in polyvinyl chloride production at B. F. Goodrich Chemical Co., Cleveland, Ohio, demanded careful consideration of materials of construction for storage-fed tanks. Tanks were to be located 10 to 12 feet from floor, near roof of building, and used to store methyl ethyl ketone, dioctyl phthalate, and di-iso-octyl phthalate.

Since quality standards for PVC are rigid, tanks had to withstand attack of corrosive plasticizers completely.

**Solution:** In September 1956, as a result of corrosion tests with various metals, tanks fabricated from an aluminum alloy were installed. Horizontal, cylindrical units have a diameter of six feet, and a height of ten feet, with a capacity of 2350 gallons.

**Results:** Aluminum tanks have been in continuous service since installation without any need for maintenance and no indications of attack from corrosive plasticizers. Since aluminum was lighter and less expensive than other materials considered, cost of installations was reduced. No painting was necessary.

(Aluminum tanks were supplied by Aluminum Co., of America, Pittsburgh, Pa.)

Check 2470 opposite last page.

### Cost, time savings of 30% with vinyl dispersion— spray coated

Production time cut six days  
on average job

Polyvinyl chloride linings and coatings now being applied by spraying or dipping at Rubber Covered Products Co., Inc., Pawtucket, R. I., have cut shop production time from an average of 8-10 days to 2-3 days for lining tanks and other equipment. Use of

## NEW SOLUTIONS

Chem-o-sol liquid vinyl dispersions has resulted in an overall 20 to 30 percent cost saving.

In addition to the greatly improved plant-production capacity and man-hour efficiency, dollar-devouring downtime



Free-flowing vinyl being sprayed on tank bottom pan. Use of vinyl dispersion has cut cost 20-30 percent

for customers has been cut to a minimum.

Company began using liquid-applied coatings about two years ago. Method served as an alternate to time-consuming hand work with conventional sheet linings where the temperature range in end use does not exceed 210°F. Now, standard spray guns are used, and mil thicknesses from 5 to 100 are possible.

There are also other advantages: Since coating is 100 percent non-volatile material, no shrinkage occurs. After the coating is applied, heating to 375°F, without pressure, fuses liquid into solid film. Result is a structurally strong, corrosion-resistant lining.

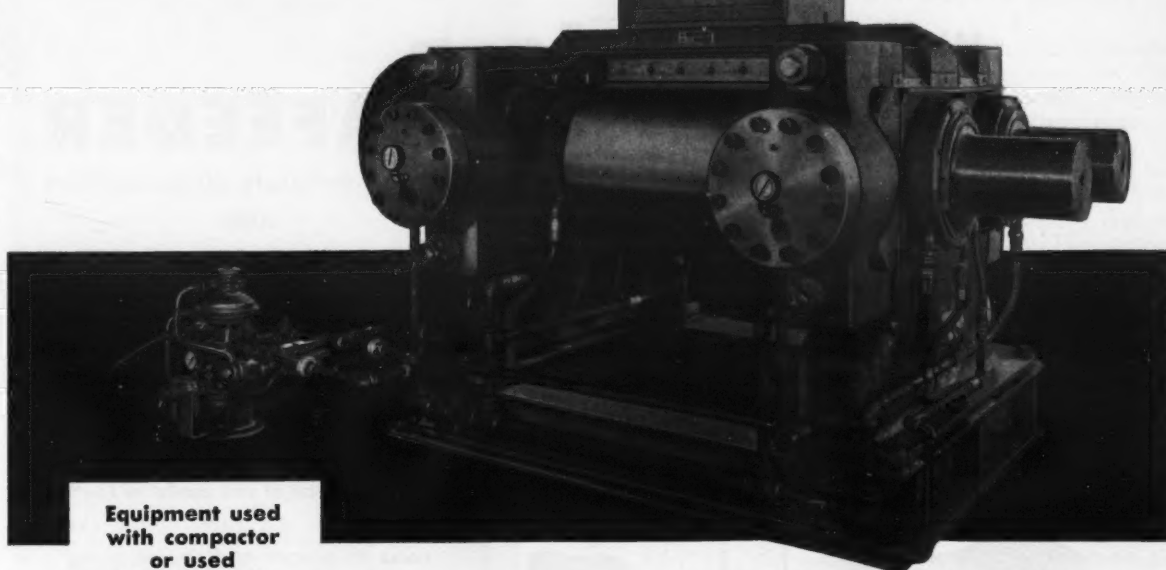
The exact properties of liquid vinyl formulations depend on specific application methods to be used, as well as specific end uses.

Viscosity can vary from a water-like consistency to that of mayonnaise. This viscosity remains stable in storage and shipment — ready for use at any time.

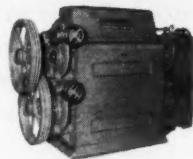
Dispersion is available in any color. To ensure complete coverage of an object, alternate films of black and gray are sprayed and fused separately until the required thickness is attained. The final sprayed-on coating compares equally well with the most careful handwork of sheet linings.

## ALLIS-CHALMERS Compacting Process

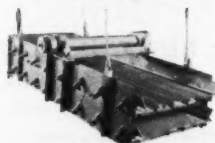
... more economical than any other method of agglomeration



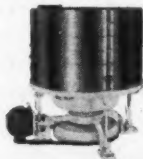
Equipment used with compactor or used independently



Granulating Mill



Aero-Vibe Screen



Gyratory Screen



A-5582

## Upgrade for Profits ... Mechanically

Precise control of *particle size, density and solubility factors* is now assured with the Allis-Chalmers compacting process. The heart of this efficient, completely mechanical system is this new Allis-Chalmers compacting mill.

### Converts Loss Into Profit

By-product material, too fine for use, from the original process, is first densified into slabs or flakes in the compacting mill. Agglomerated product is then granulated in the roller-type mill and separated in the vibrating or gyratory screen. This conversion of by-product material into a usable product changes loss into added profits.

Get Bulletin 07B8836 for the complete story. Ask your A-C representative for a copy, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

Aero-Vibe is an Allis-Chalmers trademark.

# ALLIS-CHALMERS

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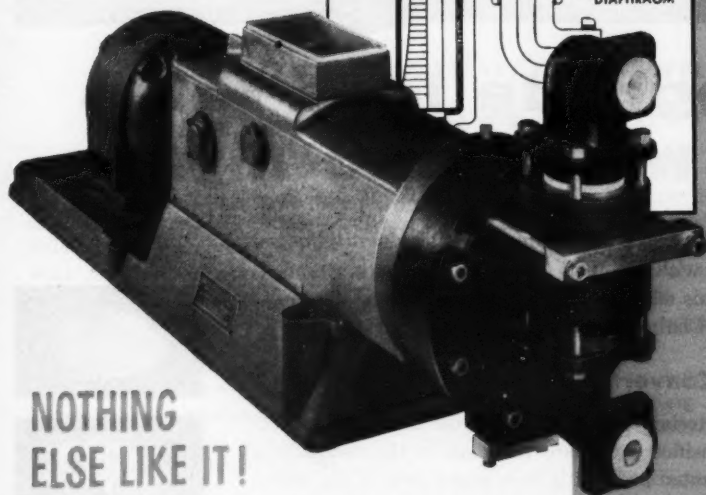
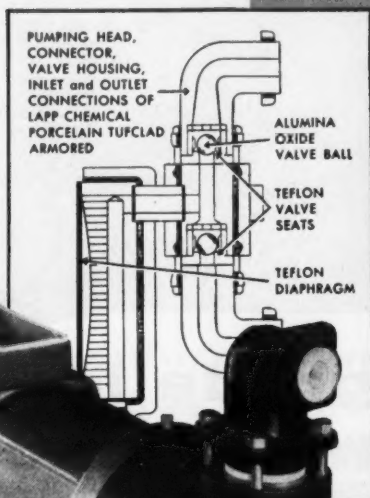


**You Can Pump** in controlled volume  
**HYDROCHLORIC ACID...all concentrations**  
**CHLORINATED HYDROCARBONS**  
**CORROSIVE METALLIC SALT SOLUTIONS**  
**DILUTE ACIDS**  
**MIXED ACIDS**  
**WITH**

**Lapp**  
**PULSAFEEDER**

**COMPLETELY NON-METALLIC CONSTRUCTION**  
**AND**

**NO STUFFING BOX TO LEAK**



**NOTHING  
ELSE LIKE IT!**

Lapp Pulsafeeder is the combination piston-diaphragm pump for controlled-volume pumping of fluids. Reciprocating piston action provides positive displacement. But the piston pumps only an hydraulic medium, working against a diaphragm. A floating, balanced partition, the diaphragm isolates chemical being pumped from working pump parts—eliminates need for stuffing box or running seal. Pumping speed is constant; variable flow results from variation in piston-stroke length—controlled by manual hand-wheel, or, in Auto-Pneumatic models, by instrument air pressure responding to any instrument-measurable processing variable.

Solid Lapp Chemical Porcelain, combined with parts of alumina ceramic and Teflon plastic, is used for the liquid end of this model of Lapp Pulsafeeder. All parts which can come in contact with liquid being pumped are non-metallic, chemically inert. Thus, positive-displacement metered pumping of "hard-to-handle" corrosive chemicals is made certain and permanently trouble-free.

**WRITE FOR BULLETIN 440**  
*with typical applications, flow charts, description and specifications of models of various capacities and constructions. Inquiry Data Sheet included from which we can make specific engineering recommendation for your processing requirement. Write Lapp Insulator Co., Inc., Process Equipment Division, 557 Poplar St., Le Roy, N. Y.*

**Lapp**

**NEW SOLUTIONS**

Spraying applications are particularly suitable for large, irregular-shaped objects that cannot be dipped. Other applying methods are: wiping, casting, spreader coating, and low-pressure forming.

(Chem-o-sol is product of Chemical Products Corp., King Philip Rd., East Providence, Rhode Island.)

Check 2472A opp. last page.

**Old tank rejuvenated —  
company saves \$\$\$...**

Thirty-yr-old concrete tank re-lined for new role

**Problem:** When new chlorine water manufacturing facilities were installed at Oxford Paper Company, Rumford, Maine, a few years ago, engineers needed a tank to fit into system to store corrosive pulp-bleaching solution before it was sent to bleaching tower. Space was limited and company was trying to keep equipment costs to a minimum.

**Solution:** Engineer decided to "rejuvenate" 30-year-old concrete tank for this purpose. Previously used to store hypochlorite, the 16x16x12'-high tank could be used at its same location — meaning savings in time and expense.

To prepare tank for its new role, sides and bottom were lined with 3/16"-thick saran-rubber sheet. A 3 1/2"-thick acid-resistant brick lining was placed on top of this. Phenolic-resin mortar was used to set brick. Top (inside) of tank was given eight coats of special saran-base coating. Pipe connections to tank were rubber-lined.

**Results:** Tank has operated trouble-free for over four years, handling 65°F chlorine water. Concentration of solution is about 0.312 lb chlorine per cu ft water. Company estimates that by rebuilding the old tank it saved at least \$1000 over price of new tank.

(Corrosion-resistant linings were installed by Stebbins Engineering & Mfg. Co., Semco Bldg., Watertown, N.Y.)

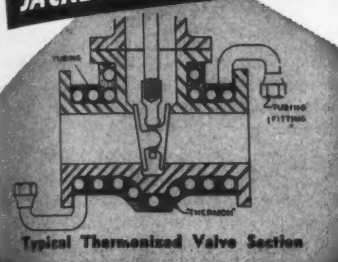
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Check 2472 opposite last page.

# Thermon

The Revolutionary New Solid  
**HEAT TRANSFER  
MEDIUM**

**SAVINGS UP TO 75%  
over  
JACKETED EQUIPMENT**



Thermon, the product, and Thermonizing, the process, represent a revolutionary new concept in the science of external heat application. Thermon is a non-metallic plastic compound with highly efficient heat transfer properties, and is easily applied in a viscous paste form over either steam traced or thermal electric systems. It completely surrounds the tracer tubing and conducts heat to the entire surface to be heated.

Definite Advantages of Thermonizing are:

1. **LOW COST**—save up to 75% over equal jacketed equipment.
2. **EXCELLENT HEAT TRANSFER**—Exceeds steam traced equipment approximately 1100% and very closely approaches jacketed equipment.
3. **DEPENDABILITY**—no hot or cold spots.
4. **WIDE TEMPERATURE RANGE**—used for sub-zero cooling or heating to 750°F.
5. **NO JACKET PLUGGAGES OR PRODUCT CONTAMINATION**—in case of equipment failure, Thermon separates product from heating medium.
6. **GOOD MECHANICAL AND THERMAL SHOCK RESISTANCE**—cracking, spalling, and degradation are all nil—less than 1% linear shrinkage.
7. **ADAPTABLE**—may be used with either steam traced or thermal electric equipment—installed at our shops or your job location.
8. **RAPID DELIVERY**—use of standard equipment permits minimum delivery time.

Write for comprehensive brochure about revolutionary Thermon!

**THERMON MFG. CO.**  
1017 Rosine • P.O. Box 1961  
Houston, Texas

## NEW SOLUTIONS

### Corrosive soil conditions effectively combated by cathodic protection

**Problem:** Casing corrosion was an expensive item at Continental Oil Co.'s producing operations near Ventura, Calif. Many of the 165 producing wells were subject to leaks and serious deterioration from corrosive underground soil conditions.

**Solution:** In February 1956, all 165 wells were given cathodic protection. Three anodes are located at 165 ft from each well. Buried cable connects anodes to rectifier and rectifier to well. Since maintaining constant current is essential to cathodic protection system, dependability of cable is important. Cathodic protection cable consists of a



Burying cathodic protection anode with cable attached for one of 165 wells. System is successfully combating corrosive soil conditions

standard flexible conductor, polyethylene insulation, and a polyvinyl chloride jacket. All-thermoplastic construction has high resistance to electroendosmosis, as well as moisture, most acids, alkalis, and chemicals usually found in corrosive soil areas.

A minimum current of 5 amps is impressed on each well.

**Results:** After 18 months of operation, cathodic protection system has reduced frequency of casing leaks and is expected to minimize repair costs.

(Cathodic protection cable was supplied by Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.)

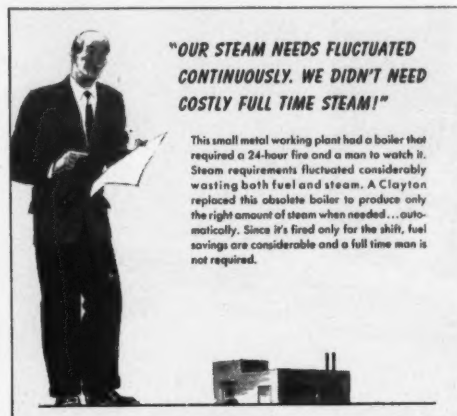
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## How a Clayton STEAM GENERATOR



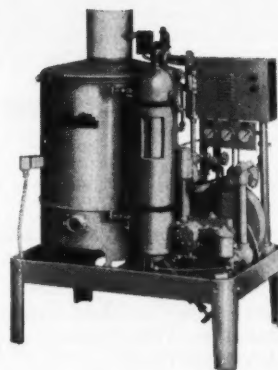
**"WE WERE FACED WITH AN OBSOLETE  
CENTRAL BOILER ROOM AND  
DETERIORATING TRANSMISSION LINES"**

This well known chemical company had a sprawling plant with long transmission lines and condensation problems. Fluctuating steam needs throughout the plant made steam production a problem. The ordinary boiler had to be kept at full pressure all day...fired all night. Seven Clayton Generators strategically located now provide just the right amount of steam—when and where needed. They are shut down at night. These seven Clayton generators installed cost less than the cost of new transmission lines.



**"OUR STEAM NEEDS FLUCTUATED  
CONTINUOUSLY. WE DIDN'T NEED  
COSTLY FULL TIME STEAM!"**

This small metal working plant had a boiler that required a 24-hour fire and a man to watch it. Steam requirements fluctuated considerably wasting both fuel and steam. A Clayton replaced this obsolete boiler to produce only the right amount of steam when needed...automatically. Since it's fired only for the shift, fuel savings are considerable and a full time man is not required.



**"IT WAS HOPELESS! WE NEEDED  
MORE STEAM AND WE DIDN'T  
HAVE ROOM FOR IT!"**

Here was a well known beverage syrup company located in "midtown" squeezed in between buildings on all sides. To meet its additional steam needs, it went in only one direction...up! Since a Clayton produces the same amount of steam in only one fourth the space and weighs only a fraction as much as an ordinary boiler, it was relatively simple to put two Clayton steam generators on the roof! The installation was quick and inexpensive.



**Clayton**

MANUFACTURING COMPANY

Sirs: Please send us more information on Clayton Steam Generators.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

We use steam for \_\_\_\_\_

Send to: Clayton Manufacturing Company  
403 N. Temple City Blvd.  
El Monte, California

**EXCLUSIVE!**

Compare Clayton's 5-year published coil warranty covering material and labor.



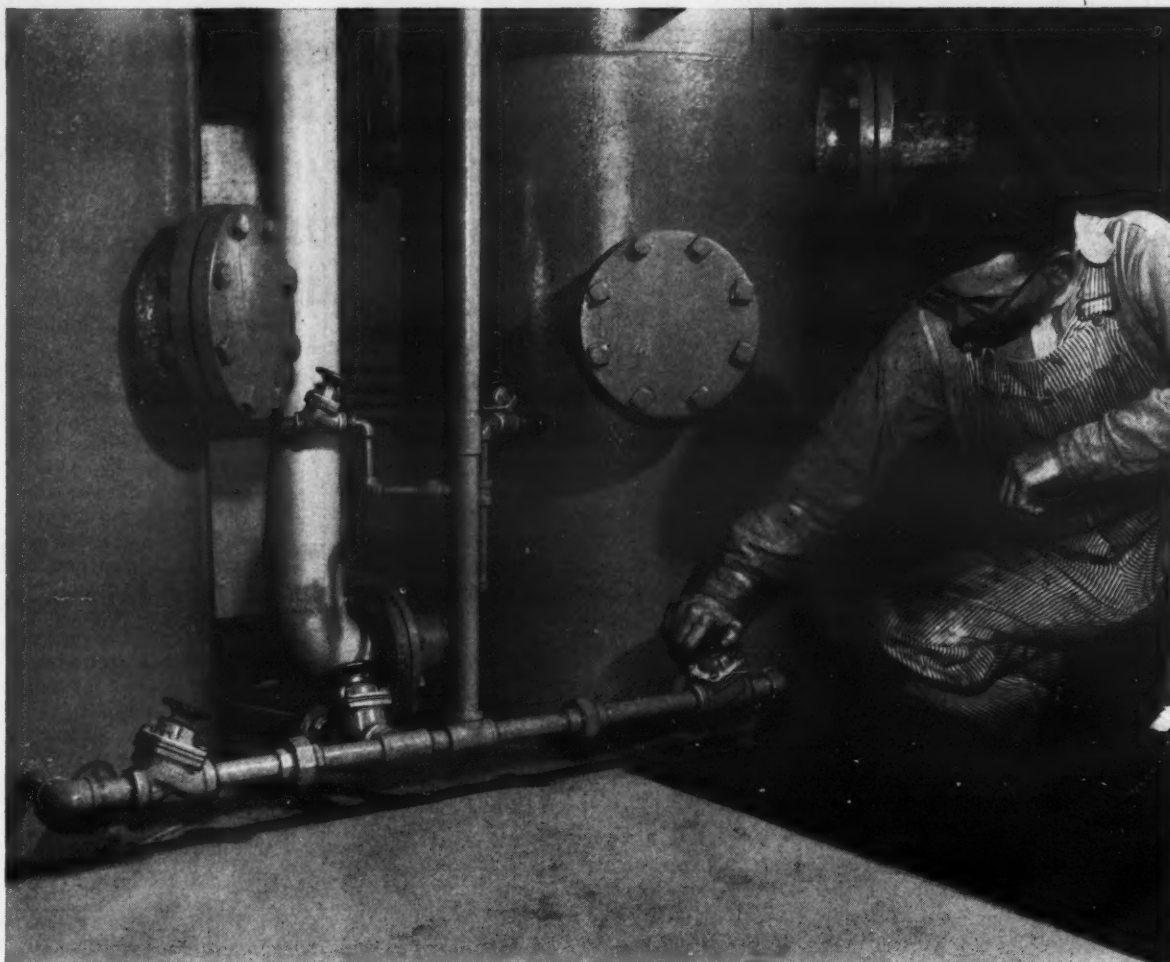
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Check 2474 opposite last page.

DECEMBER 1957



## How Liquid Carbonic stopped potassium permanganate leakage



## 700% longer service with these Crane valves... still going

This case history could save money in your own operation.

Liquid Carbonic Corporation, Seattle, Wash., is using these Crane packless diaphragm valves to handle potassium permanganate in lines to scrubbers. Before installing Crane No. 1610  $\frac{1}{2}$ " and 1" valves, this dry ice plant had to replace valves of another make at least every 6 months. Constantly recurring leakage around stems called for frequent stuffing box maintenance and hindered operations.

Since changing to Crane packless dia-

phragm valves, there has been no leakage, no trouble of any kind in  $3\frac{1}{2}$  years. Valve service is already 700% better. Here's why: Crane packless diaphragm valves completely eliminate the need for stem packing and the problems of stuffing box leakage and maintenance. The diaphragm seals the bonnet from line fluids.

Make sure your valves have correct design, better materials, precision assembly, thorough testing... insist on Crane, from the world's largest, most complete line of valves and fittings for industry.



ASK your Crane Representative for Crane Folder AD-1942 on packless diaphragm valves, or write Crane Co., address below.

# CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855 — Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Check 2477 opposite last page.

## NEW SOLUTIONS

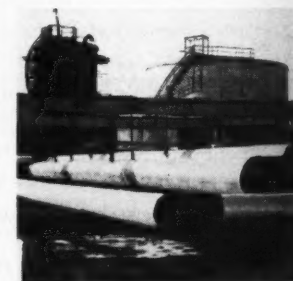
### Esso saves \$500,000 by insulating lines for steam and oil

Mineral wool cuts loss of heat 95%

An estimated saving of more than \$500,000 worth of heat annually has been obtained by Esso Standard Oil Co. by using a spun mineral wool overcoat for steam and fuel oil lines at its Bayway refinery.

In exchange for high and low-pressure steam, refinery supplies adjacent utility generating station with water and high viscosity fuel oil. Main trunk of pipeline is composed of battery of five parallel, carbon steel pipes, each over 6000 ft long. This includes two 30-inch diameter low-pressure steam lines operating at 462°F and 142 psig; one 20-inch, high-pressure steam line at 740°F and 730 psig; one eight-inch, steam-traced, high-viscosity fuel line at 400°F and 240 psig.

Over 30,000 ft of mineral wool blanket was used for the installation. Felted mineral fi-



Portion of steam and oil lines at Esso's Bayway refinery. Insulation saves an estimated \$500,000 worth of heat annually

bers are sandwiched between a sheet of expanded metal lath on outer surface and strips of expanded metal on inner surface. Covering was wrapped around lines and meeting edges tied at both longitudinal and circumferential joints.

Next roofing felt was wrapped, lapped, and stapled. An aluminum wrapper was final step to provide a weather-resistant shell.

At sharp turns where aluminum was not practical a fin-

CHEMICAL PROCESSING



# U.S.I. CHEMICAL NEWS

★

A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries

★

## U.S.I. Joins Mallory And Sharon in Integrated Company to Produce Zr, Ti

U.S.I. will soon join in the management of Mallory-Sharon Titanium Corporation which will change its name to Mallory-Sharon Metals Corporation. The reorganized company will then produce zirconium and titanium metals and mill products, and other special light metals such as hafnium. Each of the following companies owns a one-third interest in the new enterprise: National Distillers and Chemical Corporation (U.S.I. Division), P. R. Mallory & Co., Inc. and Sharon Steel Corporation.

All assets of both the Mallory-Sharon Titanium Corporation and Reactive Metals, Inc., as well as USI-National Distillers' zirconium plant and forthcoming titanium plant will be combined in the newly formed corporation. With assets exceeding \$55 million, the new company will be the largest fully integrated producer of special metals.

Presidents of the three owner companies have made this joint statement: "This consolidation of interests creates a completely integrated special metals company with technical 'know-how' and facilities for every step, from original chemical process to production and fabrication of finished products. The benefits from this strengthening of operations, plus the combination of current and future research activities, hold great promise for present production of titanium and zirconium and for other special metals as well."

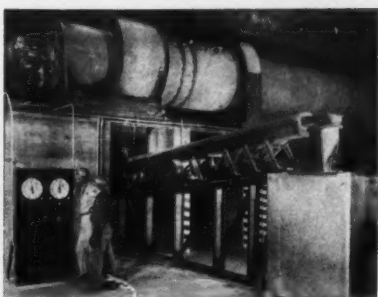
### Zirconium Metal Plant Starting Up

In 1956 U.S.I.-National Distillers was awarded a contract by the Atomic Energy Commission to supply one million pounds of zirconium metal annually for a five-year period. A plant was designed and built at Ashtabula, Ohio with a design capacity of 2 million pounds per year, and the plant is now in process of being started up. Hafnium sponge and oxide will also be produced as an adjunct to the zirconium operation.

A titanium sponge plant with a design capacity of ten million pounds per year is under construction at Ashtabula.

Both of these plants have been designed to utilize a new sodium-reduction process developed by U.S.I.-National Distillers. It is

MORE



Zirconium oxide kiln in chemical processing section of Mallory-Sharon Metals Zr plant.

## Methionine Given After Exposure Reduces Damage From Radiation

### Report Is First Evidence of Methionine's Effectiveness Against Tissue Breakdown When Given After Exposure to Radiation

New experimental evidence indicates that the sulfur amino acid, methionine, is even more effective in reducing tissue damage caused by radiation when administered *after* radiation exposure than it is when given *before* exposure.

### Brightness Is Controlled By pH in Sodium Peroxide Bleaching of Groundwood

A recently reported investigation into the fundamental chemistry of bleaching groundwood with sodium peroxide indicates that reaction rate and pulp brightness increase with pH. However above a certain pH, a colored compound is formed which tends to yellow the pulp. Therefore there is, in commercial practice, an upper pH limit for the production of pulp having maximum brightness.

pH	Time to reach max. brightness, min.	Effective Na peroxide consumption, g./l.	Maximum brightness, %
9.0	180	0.10	57.1
10.0	130	0.33	59.3
10.5	110	0.47	60.2
11.0	80	0.53	60.7
11.5	70	0.53	60.2
12.0	40	0.56	60.4
12.5	20	0.48	59.2

Sodium peroxide bleaching of groundwood has been used for some time by pulp makers. It produces a relatively large increase in brightness at low cost, without affecting pulp quality adversely or decreasing yield materially.

This study reveals that the rate of total peroxide consumption increases as pH rises from 9 to 12, due largely to the increased rate of the peroxide-groundwood reaction. The rate at which peroxide decomposes to form oxygen also goes up with pH, but this is minimized by materials in the groundwood and by adding stabilizers.

It was also learned that the rate and amount of brightness improvement increases with pH. Yellow color, mentioned previously, increases at the same time, the effect being more pronounced toward the end of the bleaching period. It causes reversion of brightness in some cases.

The most effective bleaching under the conditions used by the investigators was obtained at pH 11. Here the peroxide-groundwood reaction is fast enough, in relation to the decomposition reaction, to give appreciable bleaching in the first third of the bleaching period. On the other hand, the pH level is not high enough to produce excessive color shift and brightness reversion.

Sodium peroxide for groundwood bleaching is made from metallic sodium at U.S.I.'s plant in Ashtabula, Ohio.

Earlier reports have demonstrated methionine's ability to protect experimental animals from the effects of subsequent exposure to X-ray irradiation (U.S.I. CHEMICAL NEWS, Sept.-Oct., 1955). The present work, reported in a leading English scientific journal by Indian scientists working in Bombay, is believed to be the first to show methionine's post-irradiation effectiveness.

In the tests, deoxyribonucleic acid (DNA) levels in the liver, spleen and bone marrow were used as a measure of the extent of radiation damage. DNA is the substance in the nucleus of all cells believed to carry the mechanism of heredity. The researchers found that DNA levels in untreated animals were reduced by as much as 87% after exposure to radiation. DNA in methionine-treated animals was reduced to only about one-half of pre-exposure levels.

Methionine administered prior to irradiation afforded a considerable amount of protection, but was less effective than post-irradiation treatment. The radiolability of methionine—its tendency to be destroyed by ionizing radiations such as X-rays—is believed to account for this reduced effectiveness.

In evaluating the pre- and post-irradiation effectiveness of methionine, however, it should be noted that in the recent work methionine was given intraperitoneally. It has been reported (U.S.I. CHEMICAL NEWS, July, 1957) that radiation can cause a decrease in the ability of the body to absorb methionine that has been fed orally.

### Methionine Aids Nucleic Acid Synthesis

The specific means by which methionine acts to prevent tissue damage from radiation is related to the nucleic acid synthesizing mechanism itself. Methionine is known to play a part in two chemical processes which are involved in the production of DNA—transmethylation and phosphorylation. (Methionine is a principal source of methyl groups for the animal organism and is a precursor of creatine, which is active in the phosphorylation process.) Thus, by aiding two of the essential routes by which nucleic acids are made, methionine keeps the synthesizing mechanism in order and exerts a therapeutic influence on radiation injury.

The considerable amount of research that has been done on methionine's effectiveness in minimizing radiation damage stems from methionine's well known ability to promote healing of wounds and burns. It is also a detoxifying agent through its action on the liver.

MORE

# U.S.I. CHEMICAL NEWS

## CONTINUED

### Methionine

Methionine also is known to improve feathering in poultry and hair coat quality in fur bearing animals. As the only sulfur-containing essential amino acid, it is widely used in the manufactured feed industry as a protein supplement to promote growth and health in livestock and poultry.

The first commercial synthesis of methionine, which has led to its widespread use in medical and animal feed applications, was pioneered by U.S.I.

## CONTINUED

### New Company

believed to be the lowest cost method developed to date for the production of these metals. Mallory-Sharon Metals will be granted an exclusive, royalty-free license in the U. S. for the production of titanium, zirconium and other metals by this process.

Sodium is supplied by the existing

U.S.I.-National Distillers sodium operation three-quarters of a mile away. At Ashtabula, Mallory-Sharon Metals will also have facilities for melting zirconium metal into ingots.

Titanium sponge will be melted and both metals fabricated at the existing Mallory-Sharon plant at Niles, Ohio.

### High Purity Silicon Being Made Via Sodium Reduction

High purity metallic silicon for electronics use in semi-conductor devices is now being produced by the sodium reduction of silicon tetrachloride. The product contains boron in the order of two parts per billion, and has resistivities up to 500 ohm-centimeters.

Several thousand pounds of the material have already been manufactured in one plant overseas, and indications are that this process is more economical than either hydrogen reduction of silicon tetrachloride or reduction of silicon monoxide.

### New Cooling Towers Packed with Polyethylene Grids

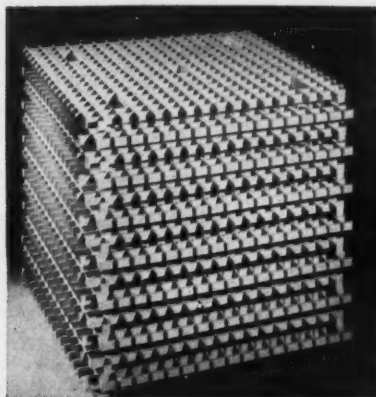


Photo shows typical stacking arrangement of polyethylene grids. (courtesy Fluor Products)

Polyethylene is now being injection molded into grid packings for water cooling towers. These grids are designed to provide the air-water contact surface usually provided by wooden bars or slats. They cool very efficiently, and eliminate maintenance problems due to their strength and corrosion resistance.

The grids are available in 2 sizes (3 ft. sq. and 2 ft. by 4 ft.). They are stacked vertically two inches apart in the cooling tower. This spacing arrangement allows for horizontal distribution of rising air and cascading water. It provides the same cooling efficiency as would the usual unspaced series of wooden slats while saving weight and material.

In addition to applications in new industrial and air conditioning cooling towers, these polyethylene grids can replace worn out portions of wooden packings in existing cooling towers. They have potential in gas scrubbers, trickling filters and other operations where efficient gas-liquid contact is desired.

## TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U. S. I.

**Polyethylene packaging materials** are illustrated in a recent brochure. Bags, sheets, drum-liners and pressure-sensitive tapes are described, as well as water vaporproof, flexible and protective wraps made of barrier material. **No. 1291**

**Buffer salts in disposable packets** are now available. Each packet is carefully weighed, has been lot-analyzed for purity. Contents dissolved in a liter of water provide a ready-to-use buffer solution. **No. 1292**

**Tape entry to computers** is facilitated by a new machine with internal core storage, which gathers asynchronous digital information from external sources and combines them in any sequence with record numbers and manually inserted data. **No. 1293**

**A new pamphlet on silica** discusses the history, the chemical and physical properties, the composition, and the porosity of the chemical. Included is a refractory comparison chart. **No. 1294**

**A calibrated dispenser** delivers a specific volume of liquid from 1 cc. to 100 cc. rapidly and repeatedly. Measurement is automatic, said to be accurate to within 1%. Can be used for volatile, toxic, or alkaline liquids. **No. 1295**

**Two monomeric ester-type plasticizers** are said to be useful for safety glass, synthetic rubbers and lacquers, and as plasticizers for cellulose acetate butyrate, polystyrene, acrylic resins and ethyl cellulose. **No. 1296**

**A pamphlet on fire research** reports of the facilities, personnel and management of the principal agencies engaged in this work. It also describes tests of various materials and fire-protection systems. **No. 1297**

**A polyethylene pump** is now being made for use with inflatable boats and mattresses. Air is trapped inside the bag by folding the top together, and forced into the mattress through a valve by compressing the bag. **No. 1298**

**Oleoresin mace**, a new spice oleoresin, is described as a dark, reddish-brown, homogeneous liquid, and is said to be completely solvent-free. It contains from 50 to 60 cc. of volatile oil per 100 grams net. **No. 1299**

**A new nickel stripper** is reported to contain no cyanide, caustic or acid, and to be stable over long periods of time, even at high temperatures. Manufacturer claims it will not fume, pit or corrode. **No. 1300**

## PRODUCTS OF U. S. I.

### PHARMACEUTICAL PRODUCTS:

DL-Methionine  
N-Acetyl-DL-Methionine  
Riboflavin USP  
Urethan USP  
Intermediates

### OTHER PRODUCTS:

**Alcohols:** Ethyl (pure and all denatured formulas), Normal Butyl, Amyl, Fusel Oil; Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL® PR.

**PETROTHENE® Polyethylene Resins.**

**Esters, Ethers and Ketones:** Normal Butyl Acetate, Dibutyl Phthalate, Diethyl Carbonate, Diethyl Oxalate, Ethyl Acetate, Ethyl Ether, Acetone, Diatoal®.

**Intermediates and Fine Chemicals:** Acetoacetylides, Dimethyl Hydrazine, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Chloride, Ethyl Sodium Oxalacetate, U.S.I. ISOSEBACIC® Acid, Methyl Hydrazine, Sodium Ethylate Solution, Triethyl Aluminum, Trimethyl Aluminum, Urethan USP (Ethyl Carbamate).

**Animal Feed Products:** Calcium Pantothenate, Choline Chloride Products, MOREA® Premix, Special Liquid Curbay®, DL-Methionine, Niacin USP, Riboflavin Concentrates, Vitamin B<sub>12</sub> and Antibiotic Feed Supplements, Vacatone® 40, Vitamin D<sub>3</sub> and K<sub>3</sub> Products, Antioxidant (BHT) Products, Special Mixes, U.S.I. Permadry Products (Sealed-In Vitamin A).

**Inorganic Chemicals:** Ammonia, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide, Sulfuric Acid.

**Metals:** Titanium Sponge, Zirconium Sponge, Zirconium Platelets, Hafnium Oxide, Hafnium Sponge.

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**U.S. INDUSTRIAL CHEMICALS CO.**

Division of National Distillers and Chemical Corporation  
99 Park Avenue, New York 16, N. Y.



## NEW SOLUTIONS

ish coat of plastic insulation and asphaltic mastic weatherproofing compound were used. In order to maintain appearance, these sections were coated with aluminum paint.

According to Esso engineers, mineral wool jacket reduces heat lost from steam lines by approximately 95%, compared to an uninsulated line.

(Mineral wool insulation and finishing cement are products of Baldwin-Hill Co., Trenton, New Jersey.)

Check 2478 opposite last page.

### **Molten metal converted without grinding into fine particles**

Up to 70% passes through 40-mesh screen

Molten ferrosilicon is being directly disintegrated into a fine powder by a recently developed process.

Developed for the Rhude Media Company, Hibbing, Minnesota, for production of heavy-media material used in ore beneficiation, process achieves granulation through force of collision of a high-velocity jet of water and gas with a falling stream of molten metal.

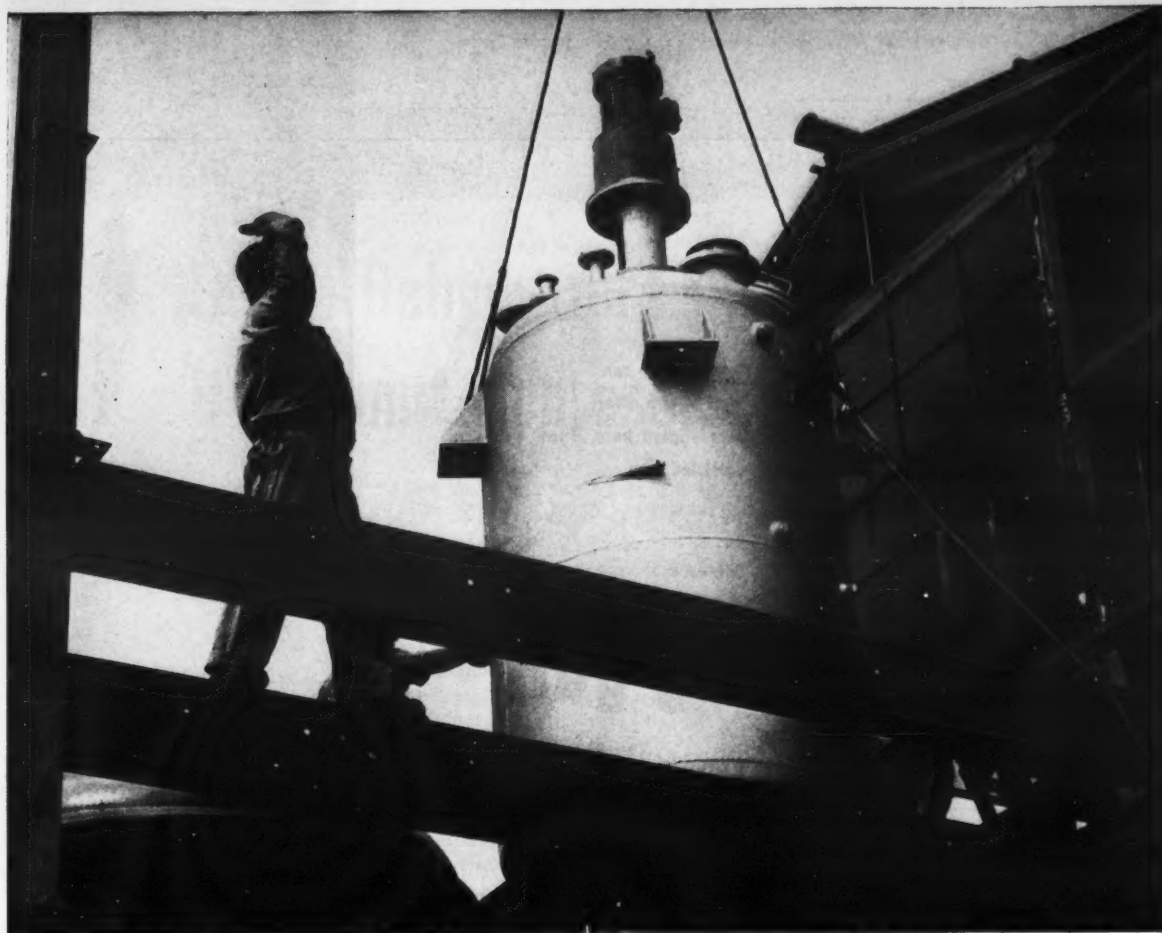
Process creates rounded or generally spherical particles. With ferrosilicon, as much as 50% of particles pass through a 65-mesh screen, and up to 70% through a 40-mesh screen.

Fineness and distribution of particle size is determined by several variables. Among these are relative sizes of water-gas jet and stream of molten metal.

Roundness of particle is determined also by surface tension of alloy.

(Process was developed by Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.)

For more information on product at left, specify 2479 . . . see information request blank opposite last page.



## No HF corrosion with new Monel-clad vessel

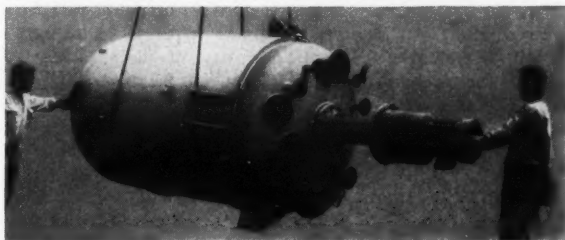
Past savings prompt Catalin Corporation to add another Lukens clad steel alkylolation reactor

Resistance to small amounts of hydrogen fluoride resulting from the hydrolysis of boron trifluoride catalyst—at 250 deg. F. and 50 psi—is a major design requirement for Catalin Corporation's alkylolation reactors.

Catalin met the requirement and kept original costs down in reactors such as this with Lukens 5/8" 20% Monel-clad steel. Monel cladding adequately resists the hydrogen fluoride. The low-cost A-285 backing steel provides the initial economy over solid high alloy. Be-

cause the kettle is jacketed, heat transfer is enhanced by the clad steel. The material also resists abrasion. Long life is assured.

It's another example of how Lukens clad steels, from 3/16" gage up, are improving efficiency and saving money in the chemical industry. Only Lukens gives you a choice of 19 cladding and 11 backing metals—to meet virtually any tank or pressure vessel need. Consult your equipment builders or write for new technical booklet, "Clad Steel Equipment." Address Manager, Marketing Service, Room 951, Lukens Steel Company, Coatesville, Pa.



Alkylating kettle of Lukens 5/8" 20% Monel-clad steel promises corrosion protection, economy at Catalin Corp.'s Fords, N. J. plant.

This is Lukens clad steel—not a lining, not a soldered-on surface, but a solid steel plate—one side corrosion resistant metal permanently bonded over-all to a rugged, economical backing steel.



Helping industry choose steels that fit the job

Check 2480 opposite last page.





Distilled monoglycerides — liquid fat products — can form fast plastic-like gels within a second or two after addition of water by using techniques revealed here. The pharmaceutical, cosmetic, and food industries may find interesting uses for these —

## Fast-forming gels that are pure and nutritious

**W**HEN a concentrated distilled monoglyceride is melted and stirred with water at about the same temperature, a firm gel is formed within a second or two. The gel contains about 15 to 25% water, and is not dispersible in water. The details were told at the recent meeting of the American Oil Chemists' Society in Cincinnati, by Dr. George Y. Brokaw and William C. Lyman.

Since these highly purified liquid monoglycerides are made from fats and oils, and are edible and nutritious, the gel, if made with pure water, is also edible. In modified form, the gel could be a means of boosting the "whip" in whipped toppings for desserts. When added to milk, a bit of the material in a crystalline form might provide housewives with a new kind of whipped dairy product. The crystalline form occurs when the gel is cooled below the melting point of its monoglyceride.

However, as many possibilities lie in the cosmetic, pharmaceu-

tical, and other fields as lie in foods.

A liquid form can be compounded that will set to a gel on contact with moisture. This might lend itself, for instance, to combination with medication for efficient medical application. It might also merit consideration for such materials as hair dressings, and deodorant creams.

In dustriy, the gel might find a role as a special lubricant or anti-rust additive.

### How to Make Gels

There are two ways.

The first is to add a monoglyceride to water, and stir as temperature is raised. As the temperature rises, the monoglyceride coagulates into a translucent and transparent mass, at what is called the "gel point."

The second method is to heat a monoglyceride to 96-98°C and agitate vigorously. Slowly add boiling water so that any solid gel that forms locally can be dis-

solved. After the desired amount of water is added, the mixture is cooled.

### Anti-gelatin Additives

Triglycerides and distilled diglycerides will impede gelation. (Even a relatively impure monoglyceride will not gel.)

Experiments show that addition of 20% triglycerides or 40% diglycerides are equally effective in preventing gel formation. A ratio of 2:8 triglyceride to monoglyceride will give an optically clear, non-pourable mixture when mixed with a relatively small quantity of water. It appears to have a loose gel structure and absorb additional water readily, changing into a white, opaque water-in-oil emulsion.

Higher ratios than 2:8 give an opaque emulsion as soon as the water solubility limit is reached. At ratios of 1:9 or below, the solid and clear gels will not absorb additional water or disperse readily into fat-water mixture.

### Properties of Gels

The lower temperature limits of stability are related to the melting points of the monoglycerides, which are below that of water. The upper limit is close to the boiling point of water.

Gels lose water when exposed to air. Equilibrium data are not complete, but in air of relatively low humidity, water content is probably less than 5%. Therefore a gel must be kept in closed container or under high humidity conditions if it is to last.

Water is partially soluble in a pure molten monoglyceride. As water is added, the apparent melting point drops a little, and viscosity increases. At 10 to 15% (by wt) of water, viscosity increases until the mixture becomes a soft, non-pourable transparent gel. If water content is increased, this becomes firmer until no more water can be incorporated.

A typical gel has about 22 to 23% water content. By means



## Engineering Progress Report

FROM UNION CARBIDE CHEMICALS COMPANY

Fast-forming, edible gel forms when purified monoglycerides are combined with water, in technique developed by William C. Lyman (left) and Dr. George Y. Brokaw

of severe treatment at room temperature, a mono-olein gel can be made to hold as much as 45% water without leaking.

The gel may be a hydrogen-bonded structure. Conductivity is approximately that of the distilled water used and higher than that of typical water-in-oil emulsions.

### Water and Oil — and Monoglycerides

Water will dissolve in blends of mono- and triglycerides to about 10 to 25% of the monoglyceride content. For example, in adding water to a 50:50 mixture of mono-olein and cottonseed oil, the monoglyceride solubilizes the water in the cottonseed oil, and the water solubilizes the monoglyceride. Similar effects have been obtained with hydrocarbon solvents, as well as with triglycerides at appreciably lower concentrations of monoglycerides.

Many water-soluble materials can be dissolved in water before putting them into oil solution.

Gels can be dissolved in solvents such as ethanol and petroleum ether. Monoolein, ethanol, and water are miscible in many proportions. These mixtures have been studied.

In the laboratory it was also found that 15% (by wt) of water could be dissolved into 30 to 50% solutions of mono-olein in petroleum ether.

By these techniques, many water-soluble materials can be incorporated into oil solution.

(Distilled monoglycerides are products of Distillation Products Industries, Div. of Eastman Kodak Co., Rochester 3, New York.)

Check 2481 opposite last page.

# Glycol Dehydrators give 90°F. Dew Point Depressions...

## Improved regeneration systems give high glycol concentrations

There are two methods commonly used today to dehydrate natural gas: one employs glycols; the other, dry desiccants. Most authorities agree that glycol systems are less expensive in both initial and operating costs. Recent engineering advances now permit dew point depressions up to 90°F. with economical glycol-type dehydrators. Union Carbide Chemicals Company maintains an extensive engineering service group designed to help the natural gas industry obtain the best possible dehydration service with CARBIDE's diethylene glycol and triethylene glycol.

### A GRADUAL IMPROVEMENT

Diethylene glycol was first used to dehydrate natural gas in 1936 and by 1939 sixteen glycol type plants were in service providing average dew point depressions in the range of 40°F. Triethylene glycol was first used to dehydrate natural gas in 1949. The dew point depressions realized with glycol type plants have gradually increased until today the standard guarantee is a 65°F. depression or gas containing seven pounds of water per MMSCF, whichever first occurs. For sometime now, some equipment manufacturers have offered a 75°F. dew point depression guarantee.

### FACTORS INFLUENCING DEW POINT DEPRESSION

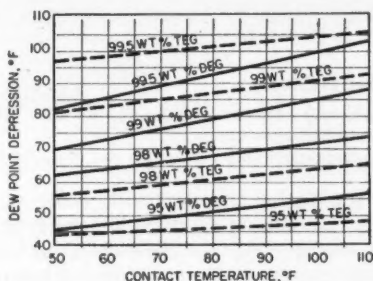
The dew-point depression obtained with a glycol dehydration plant depends upon several factors, such as:

1. Concentration of water in the lean glycol solution.
2. Glycol circulation rate.
3. Contact temperature in the top of the absorber column.
4. Efficiency of gas to glycol contact in the absorber.

Even with conservative design and operation, however, the dew point of the gas leaving the glycol contactor cannot be lower than the equilibrium value for the conditions of temperature and glycol concentration found on the top plate.

### HIGH GLYCOL CONCENTRATIONS

The high diethylene and triethylene glycol concentrations now being obtained in plant practice, prompted studies to determine the dew point depressions obtainable with such solutions.



These data indicate that both diethylene and triethylene glycol at 99.5 per cent concentrations provide dew-point depressions in the 80°-105°F. range.

At concentrations of 98 per cent and lower, diethylene glycol provides better depressions than equal concentrations of triethylene glycol, while at 99 and 99.5 per cent concentrations, triethylene glycol appears to allow a 5°-10°F. lower dew point than diethylene glycol.

### 90°F. DEPRESSION MEETS TRANSMISSION REQUIREMENTS

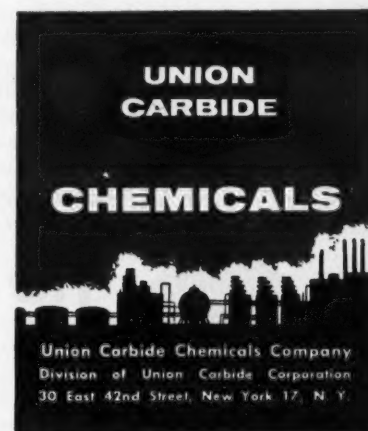
Glycol regeneration equipment on the market today is capable of producing and maintaining glycol concentrations above

99%. Thus, it is possible for equipment manufacturers to guarantee a 90°F. minimum dew point depression. There are very few instances where a 90°F. depression will not meet the water content specifications of any long distance gas transmission company.

### CARBIDE'S RESEARCH PROGRAM

Dew point depression studies are but one phase of CARBIDE's extensive research activities designed to improve the products and processes of the natural gas treating industry. CARBIDE's Technical Service Department stands ready to help you obtain the best possible results from your gas treating installations. For more information on the use of CARBIDE's glycols for gas dehydration, call the nearest CARBIDE technical representative or write, Union Carbide Chemicals Company, Department B, 30 East 42nd Street, New York 17, N. Y.

"Union Carbide" is a registered trade-mark of Union Carbide Corporation



Check 2482 opposite last page.

## NEW UNUSUAL RAW MATERIAL



## QO LEVULINIC ACID

### POLYFUNCTIONAL:

Acts as a carboxylic acid and as a ketone  
Has many active hydrogen atoms  
Cyclizes to heterocyclic forms

Levulinic acid is a stimulating chemical with which to work because of the unusual variety of its reactions. It reacts as a carboxylic acid, and it functions as a ketone. Notice, too, that the 1,4 stereochemical relationship of its functional group frequently leads to cyclization, forming heterocycles, an open door to new products for you. Condensation reactions of its methylene groups invite further investigation.

Levulinic acid can be converted in good yield to: gamma-valerolactone by hydrogenation; succinic acid by catalytic oxidation; 5-methyl-2-pyrrolidone by reductive amination; calcium levulinate by neutralization; alpha-angelica lactone by dehydration.

QO Levulinic acid is now available from our pilot plant in cans and drums. Drum carload quantities can be supplied. The manufacturing process is suitable for full scale production on a commercial unit.

Write for our new Bulletin 301 on QO Levulinic acid and a sample.



## The Quaker Oats Company

### CHEMICALS DEPARTMENT

336T The Merchandise Mart, Chicago 54, Illinois  
Room 536T, 120 Wall Street, New York 5, New York  
Room 436T, 48 S.E. Hawthorne Blvd., Portland 14, Oregon  
Room 6156T, 815 Superior Ave., Cleveland 14, Ohio

Check 2483 opposite last page.

## CHEMICAL MATERIALS

### Chemically modified fats for cosmetic, plastic, and food uses

Chemically modified fats, known as acetoglycerides, will be produced under a USDA licensing arrangement. Manufacturer plans to offer several compositions, including both liquid and solid acetoglycerides, whose physical properties cover a wide gamut.

Potential applications include their use in oils and low-melting fats where outstanding resistance to deterioration by oxidation and polymerization is required, as constituents of cosmetic formulations, as plasticizers, and in food uses such as to increase softness and gloss of candy, and as components of table spreads with long plastic ranges. Acetoglycerides also have great possibilities as special lubricants.

The acetoglycerides have been approved by the Food and Drug Administration. Their production is covered by patent 2,745,749. They are flexible, wax-like, and non-greasy in texture. Their melting point can be varied.

(Acetoglycerides will be produced by Beacon Chemical Industries, Inc., 33-51 Richdale Ave., Cambridge 40, Mass.)

Check 2484 opposite last page.

### Semi-permeable plastic containing small pores will hold liquids

Regulation of pore size and liquid viscosity control flow

Uses: In specialized products for pharmaceutical, cosmetic, office equipment, and other industries. For example, it will make self-medicating bandages, a long-lasting lipstick that won't lose its shape, and a pre-inked office stamp that can make more than 50,000 clear impressions.

Features: Plastic can be made to contain a liquid within its small pore structure. This liquid can then be given off at a predetermined rate.

Description: Product can be



formed from the raw plastic in the presence of a liquid. By regulating pore size and viscosity of liquid, flow from the product can be controlled.

Supplied as a resin dispersion of approximately 6-micron particle size, raw material is dispersed into a mixture of a bonding agent and a liquid. As heat is applied, bonding agent is absorbed into the spheres which join together to form an interconnecting pore structure which traps the liquid.

Because these pores are of such small size (2 to 3 microns), the liquid is held by capillary attraction and is uniformly distributed throughout the final product.

(Porelon is a product of Perma Industries, Inc., 4169 Beverly Blvd., Los Angeles, Calif.)

Check 2485 opposite last page.

**Reactant, reducing agent  
sodium borohydride  
now in ton lots**

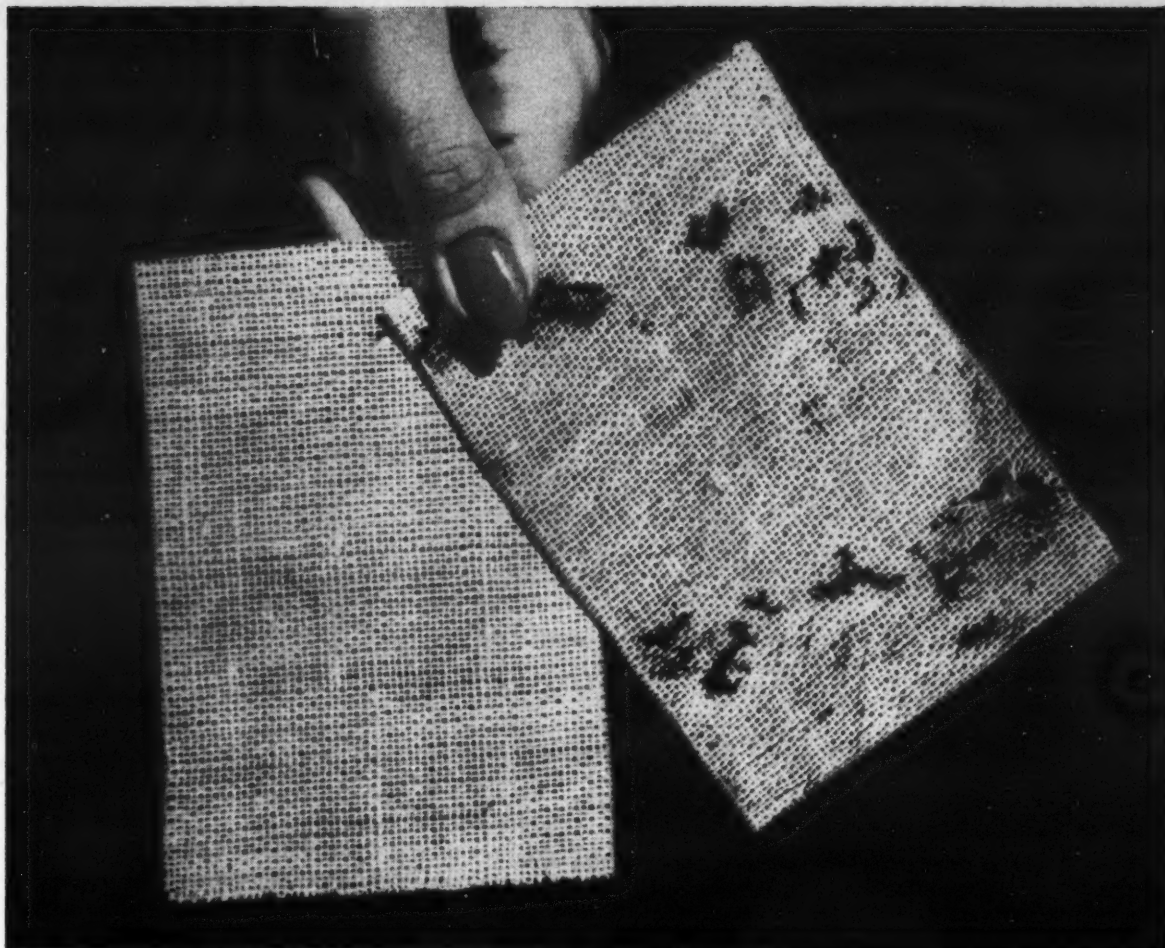
Uses: Sodium borohydride is a reducing agent for organic compounds, especially pharmaceuticals. It can also be combined with certain hydrocarbons to produce fuels that have approximately 50% more energy than common fuels.

Major uses are anticipated in treatment of wood pulp and modification and stabilization of cellulose. Foaming of plastics (such as vinyl chloride, epoxy resins, and even water-glass which will form rigid, flame-resistant insulation) are potential applications.

**Features:** Compound is ideal for many reductions as it avoids side reactions, gives high yields. It also reduces many metal ions and can itself be a source of other boron hydrides.

Reaction with boron chloride or boron fluoride in a glycol ether solvent gives diborane, an intermediate and polymerization catalyst.

The boron-containing fuels made from sodium borohydride have heating values in



Grey goods sample at left contains a Dowicide preservative. Sample at right does not. Otherwise, the two samples are identical.

## Dowicide preservatives prevent product breakdown

*... protect quality in textile goods*

Dowicide® preservative added to liquid starch sizing protects grey goods and finished textiles against discoloration, weakening of fiber due to mold growth.

The two grey goods samples shown above were exposed to conditions favoring mold growth for an equal amount of time. The untreated sample (right) is sized with an unpreserved starch. It is discolored and weakened—costly heavy bleach must now be used to remove discoloration. In contrast, the sample sized with a starch protected by

a Dowicide preservative is unaffected by same exposure. Fourteen different Dowicide preservatives do similar quality-guarding jobs in a host of products. They're used in adhesives, agricultural products, ceramics, cordage, cutting oils, disinfectants, leather, paint and paper—to name just a few. Dow laboratories are available to help you improve the quality and lengthen the service life of your products. For more information, mail the coupon to us today. THE DOW CHEMICAL COMPANY, Midland, Michigan.

THE DOW CHEMICAL COMPANY  
Dept. DO 402C-1, Midland, Michigan

Please send me further information on the uses of Dowicide preservatives for:

NAME \_\_\_\_\_ TITLE \_\_\_\_\_  
FIRM \_\_\_\_\_ ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

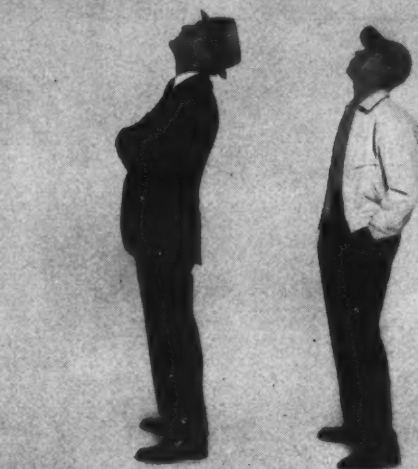
- |  |                                       |
|--|---------------------------------------|
| <input type="checkbox"/> paint                 | <input type="checkbox"/> leather      |
| <input type="checkbox"/> adhesives             | <input type="checkbox"/> ceramics     |
| <input type="checkbox"/> building materials    | <input type="checkbox"/> cutting oils |
| <input type="checkbox"/> pulp & paper          | <input type="checkbox"/> petroleum    |
| <input type="checkbox"/> other (specify) _____ |                                       |

YOU CAN DEPEND ON

**DOW**

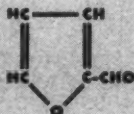
Check 2486 opposite last page.

CURIOSITY IS THE KEY TO PROGRESS



They're curious about the workers on the scaffold supported by nylon rope... an end product using furfural as a chemical intermediate

YOU CAN PROFIT FROM CURIOSITY  
ABOUT **QO FURFURAL**



Here are a few of the ways QO furfural is now being used:

- **SELECTIVE SOLVENT** for separating saturated from unsaturated compounds in petroleum lube oil, gas oil, and diesel fuel.
- **RESIN FORMER** in the manufacture of thermosetting molding powders with optimum flow-cure properties.
- **DISPERSANT** in the manufacture of resinoid-bonded grinding wheels. Solvent for coating materials.
- **CHEMICAL INTERMEDIATE** in the manufacture of hexamethylenediamine, used to make nylon; starting point for compounds containing the furan ring.

BE CURIOUS ABOUT FURFURAL • SEND FOR QO BULLETIN 204

**The Quaker Oats Company**  
**CHEMICALS DEPARTMENT**



336U The Merchandise Mart, Chicago 54, Illinois  
Room 536U, 120 Wall Street, New York 5, New York  
Room 436U, 48 S.E. Hawthorne Blvd., Portland 14, Oregon

In the United Kingdom: Imperial Chemical Industries, Ltd., Billingham, England

In Europe: Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S. A., 3, Rue Pillet-Will, Paris IX, France; A/S "Ota," Copenhagen, S. Denmark

In Australia: Swift & Company, Ltd., Sydney

In Japan: F. Kanematsu & Company, Ltd., Tokyo

Check 2487 opposite last page.

## CHEMICAL MATERIALS

excess of 25,000 Btu/lb. Compare this to conventional aviation gasoline — its heating value is approximately 18,500 Btu/lb. The new fuels also require relatively little oxygen, and therefore burn easily at high altitudes.

**Description:** Sodium borohydride is available in tonnage lots. It is made from sodium hydride, which in turn is made from sodium and boric acid.

To speed manufacture, increase safety, and facilitate recovery of the pure borohydride, sodium hydride crystals are coated with an inert mineral oil. This has been found to be far more effective than using the dry, granular hydride.

(Sodium borohydride is product of Metal Hydrides Inc., 12-24 Congress St., Beverly, Mass.)

Check 2488 opposite last page.

**Desulfurization catalyst**  
**has low bulk density,**  
**more efficiency**

**Uses:** As a desulfurization catalyst to reduce sulfur content of petroleum fractions by conversion to hydrogen sulfide.

**Features:** Performance data shows greater sulfur and nitrogen removal efficiency than other cobalt-molybdena types. Higher active metals content, superior porosity, and low bulk density are also significant improvements.

**Description:** Extruded cobalt-molybdena catalyst is designed for service in both new and existing facilities. It is said to regenerate easily with little loss of activity or crush strength. Refiners now can treat the same through-put with fewer pounds of catalyst (up to 30% less) or increase through-put on the same quantity of catalyst, and without any drop in treating level.

(AERO HDS-2 is product of Refinery Chemicals Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, New York.)

Check 2489 opposite last page.

# Mono Laurates Di

of

*Diglycol*

*Ethylene Glycol*

*Diethylene Glycol*

*Polyethylene Glycol*

*Propylene Glycol*

*Polyoxyethylene*

*Butoxyethyl*

*Glycerine*

MADE TO MEET YOUR SPECIFICATIONS



THE FLAME AND THE FLASK — SYMBOL OF QUALITY

*The C.P. Hall Co.*  
CHEMICAL MANUFACTURERS

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Check 2490 opposite last page.

CHEMICAL PROCESSING





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● If so, you'll want to insure that your copy of **CHEMICAL PROCESSING** reaches you without interruption. Just send us your new address . . . use the convenient form below.

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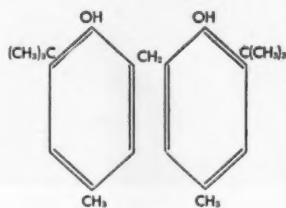
## CHEMICAL MATERIALS

### Low-melting antioxidant has 'stay power' at high temp

Protects polyethylene, rubber, polystyrene, wax, fats, oils

**Uses:** Antioxidant protects polymeric materials, such as polyethylene, petroleum hydrocarbons, rubbers, impact grade polystyrene, waxes, fats, and oils, against oxidative degradation at high temperatures.

**Features:** Material is characterized by its staying power when subjected to high temperatures. Its low melting range facilitates incorporation into products. Antioxidant is non-staining and non-discoloring. It has low toxicity.



**Description:** Called Antioxidant AC-6, the product is known chemically as 2, 2'-thiobis (4-methyl-6-tert-butyl phenol). An off-white crystalline powder, it melts at 82 to 88°C. Storage stability is excellent.

(Antioxidant AC-6 is a product of Catalin Corporation of America, One Park Ave., New York 16, New York.)

Check 2491 opposite last page.

### Pure isomers available in pilot plant lots

Pure n-amylamine; 130-amylamine; and 2-methylbutylamine, chemical intermediates, are now available in pilot plant lots. There are no secondary or tertiary amines present.

(Pure isomers are available from Ames Laboratories, Inc., Dept. CP, 132 Water St., South Norwalk, Conn.)

Check 2492 opposite last page.



# ATLAS

CHEMICALS DIVISION  
ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE  
Atlas Powder Company, Canada, Ltd., Brantford, Ontario, Canada

### FOR SPECIALTY COMPOUNDERS . . .

#### Properties and applications of RENEX® Detergents

New File Folder gives chemical and physical characteristics of the RENEX line of 14 non-ionic synthetic detergents . . . suggests applications in various domestic, commercial and industrial cleaning formulas. Check coupon for copy.



### FOR RESEARCH CHEMISTS . . .

#### condensed Catalog of Atlas Organic Chemicals

New 8-page catalog lists chemical characteristics, applications of Atlas polyols, surfactants, DARCO® activated carbons, Atlas Thermoflow polyester resins and reinforced molding compounds. Check coupon for a copy.



### FOR COSMETIC AND CLEANER SPECIALTY MANUFACTURERS . . .

#### Bulletin on formulation of "Waterless" Hand Cleaners

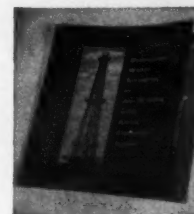
New Bulletin tells how to formulate various types of "waterless" cleaners (for removing soil from hands without need for washing with water). Includes suggested guide formulas. Check coupon below.



### FOR OIL WELL DRILLERS . . .

#### Data on Water Remover for air drilling

New Afrox foaming agent removes water influx in drilling oil wells with air or gas . . . permits high-speed drilling where not previously practical. Data on application is given in new folder . . . check coupon below.



#### ATLAS POWDER COMPANY

Dept. ASP

Wilmington 99, Delaware

Please send me the Atlas literature checked.

☐ Renex Detergents

☐ Atlas Organic Chemicals

☐ Waterless Hand Cleaners

☐ Afrox Foaming Agent

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

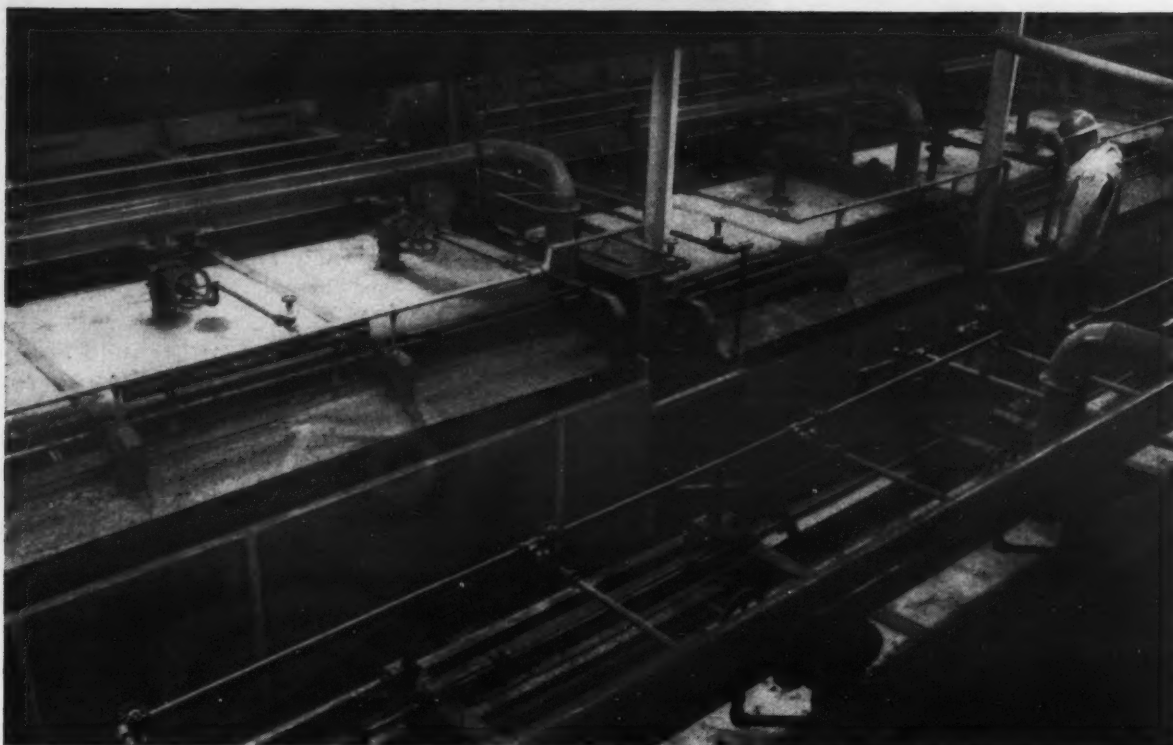
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Check 2493 opposite last page.



# HOW **HERCULES** HELPS...



**BOOST IRON OUTPUT**—Low grade, nonmagnetic iron ore is being converted into a high iron content product by The Cleveland-Cliffs Iron Company in Michigan. An important aid in this process

is Pamak® fatty acid. This agent is being used with excellent results in the flotation phase of beneficiating the specular hematite material on the Marquette Range of Michigan.



**IMPROVE PACKAGING**—Whether it be gay gift wrapping for special occasions or display packages for consumer goods, a long list of Hercules materials plays important roles. In paper and paperboard, Hercules sizing agents contribute to a stronger, more printable surface; in the inks, Hercules resins and film formers meet the most exacting requirements.



**PROMOTE BLASTING EFFICIENCY**—The Hercules "Man with the Red Valise" has become a familiar sight where industrial explosives are used. With a complete blasting cap display kit, an experienced Hercules sales representative is able to assist users in selecting proper cap and other accessories to promote efficient blasting. Hercules blasting caps are partners in dependability with Hercules® explosives.



**HERCULES POWDER COMPANY**

900 Market Street, Wilmington 99, Delaware

CHEMICAL MATERIALS FOR INDUSTRY



G57-10

Check 2494 opposite last page.

## CHEMICAL MATERIALS

### Highly soluble vitamin B<sub>2</sub> can replace riboflavin in certain cases

**Uses:** As pharmaceutical product can replace riboflavin in certain cases of vitamin B<sub>2</sub> deficiencies and in parenteral administration.

**Features:** Vitamin B<sub>2</sub> is absolutely essential to the growth of living creatures. Without it, life would stop. However, the vitamin taken by mouth does not begin to take real effect until it is converted into a more active form in the intestinal tract or in the liver.

Flavin Adenine Dinucleotide is precisely vitamin B<sub>2</sub> made into this active form. It is highly water-soluble. It works effectively where little result could be seen from prescribing vitamin B<sub>2</sub>.

**Description:** Flavin Adenine Dinucleotide (FAD) comes as brownish-yellow powder slightly darker than conventional vitamin B<sub>2</sub>. It is highly soluble in water, one gram completely dissolving in 1cc of water. Chemical formula for FAD is (C<sub>27</sub>H<sub>33</sub>O<sub>15</sub>N<sub>5</sub>P<sub>2</sub>). FAD is made by Wakamato Pharmaceutical Co., Ltd., Tokyo, and at the present time is sold in this country for research and investigation use only.

(FAD is distributed in the United States by Fallek Products Co., Inc., 165 Broadway, New York 6, N.Y.)

Check 2495 opposite last page.

### FOR MORE INFORMATION

Here's what to do when you want additional details about products and services mentioned in this issue's editorial articles or advertisements.

Note the number at end of article or advertisement. Check this key number on Reader Service slip opposite last page of this issue. Fill in slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you. He'll send you the details direct.

**Wetting agent available  
with better hard water  
and salt resistance**

Wetting agent and penetrant, now in commercial quantities, is sodium salt of di-hexyl-sulfosuccinic acid. It has improved hard water and salt resistance.

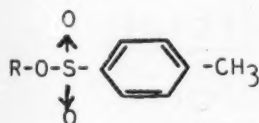
(Monawet MM-80% is product of Chemical Div., Mona Industries, Inc., Dept. CP, Paterson 4, New Jersey.)

Check 2496 opposite last page.

**New organic fields open  
with more reactive  
alkylating agents**

Uses: Should open up new fields in synthetic-organic and pharmaceutical chemistry where heat-sensitive compounds are handled.

Features: Alkylating agents enter readily into most substitution reactions. They are generally more reactive than corresponding alkyl iodides, and by their use, reaction involving introduction of an alkyl group into an organic molecule may be run at substantially lower temperatures than those necessary when alkyl halides are used.



(R = alkyl group)

Structural formula  
for alkyl tosylates

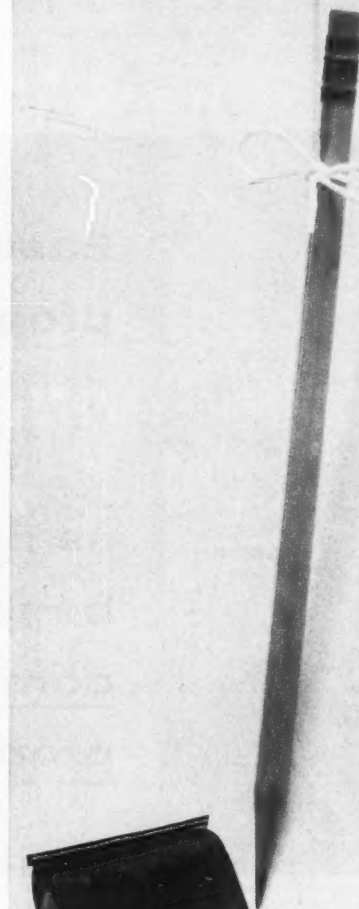
**Description:** Alkylating agents are alkyl esters of *para*-toluenesulfonic acid, known as alkyl tosylates. Except for the lower members of series (methyl, ethyl, propyl and butyl tosylates) these compounds have not been commercially available. Alkyl tosylates will be marketed at a price in line with that of corresponding alkyl halides.

(Alkyl tosylates are available from Fine Organics, Inc., 211 E. 19th St., New York 3, N.Y.)

Check 2497 opposite last page.

## thumbnail portrait

*of the first filteraid to give really satisfactory  
performance in strong alkaline solutions*



The Nerofil Bulletin provides  
more complete information. Just fill  
out the coupon for your copy.

**G.L.C. Nerofil**



*A processed carbon-base filteraid...the first complete-new type of  
filteraid developed in the past 20 years.*

**Characteristics**—Physically and chemically stable. Practically unaffected even by boiling caustic. 30 minute test in 50% sodium hydroxide at 125°F. showed no silicon solubility.

**Performance**—Clarity of filtrate excellent. Flowrates comparable to those obtained with many grades of diatomite filteraids, due to low density and high porosity of the Nerofil filter cake.

**Special Advantages**—Filter cake is combustible, an advantage in metals values recovery. Nerofil does not have the high temperature breakdown of cellulosic filteraids, nor the silicon solubility of diatomite.

**History of Use**—After pilot tests, Nerofil has been adopted by, and is being used by, firms engaged in caustic production, sulfur production, textile mercerizing, metal plating, metallurgical work, the filtration of lagnosulfonate liquors and other 'difficult' solutions.

NEROFIL DEPARTMENT,  
Great Lakes Carbon Corporation  
612 So. Flower St., Los Angeles 17, Calif.

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Check 2498 opposite last page.

**Alkyl aryl-base acid trio  
for simple preparation  
of special detergents**

**Uses:** Organic acid trio offers a simple and practical method for economical preparation of concentrated liquid detergents for textile and allied industries.

Salts of the acids function as excellent detergents, wetting agents, penetrants, and emulsifiers. They can be used as light- or heavy-duty detergents.

**Features:** Detergents made from the acids have low cloud points. They function in soft and hard waters, as well as in dilute acid and alkaline systems.

**Description:** This trio of concentrated alkyl aryl-base detergent acids contains a minimum of free sulfuric acid, which results in high solubility and salt tolerance for its alkali salts.

Made by sulfonation process, acids are viscous brown liquids, have 80 to 87% active ingredients. Free  $H_2SO_4$  is 2 to 3%, unreacted oil is 1 to 3%. Product pH is less than 1. Sodium, potassium, ammonium, and triethanol-ammonium salts are easily made by neutralizing the acids.

Three acids are available in order to give a wide range of controlled solubility in the prepared salts of these acids.

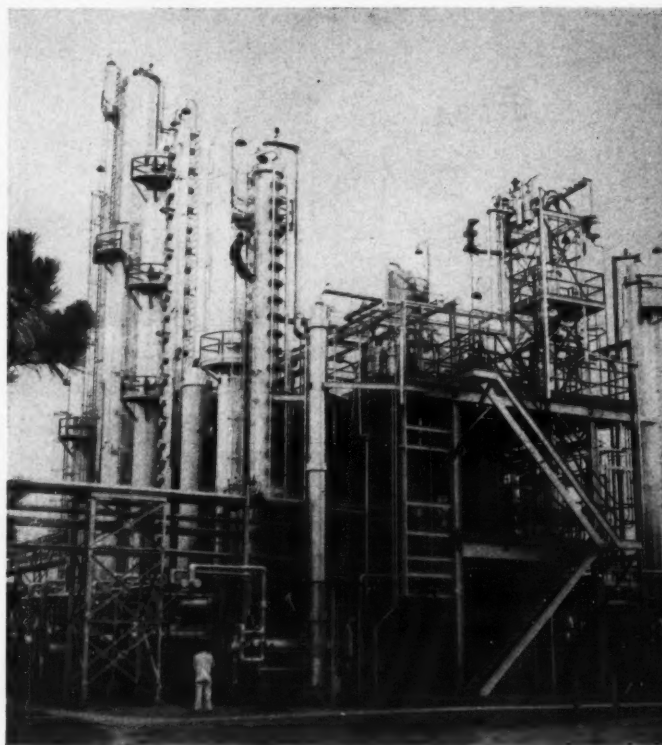
(Tenn-Acids 820, 873, and 864 are products of Tennessee Corp., 1330 W. Peachtree St., N.W., Atlanta 9, Ga.)

Check 2499 opposite last page.

# NEWS

about

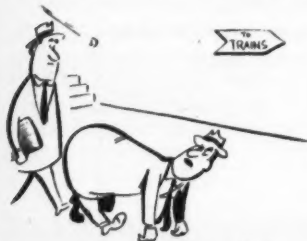
# NEOPENTYL GLYCOL



Easiman  
drops price to  
**37¢/pound**  
as new plant  
begins  
commercial  
production

Now is the opportune time to take a good hard look at the particular advantages of neopentyl glycol. This recently-introduced isobutyraldehyde derivative is now in commercial supply and lower in price.

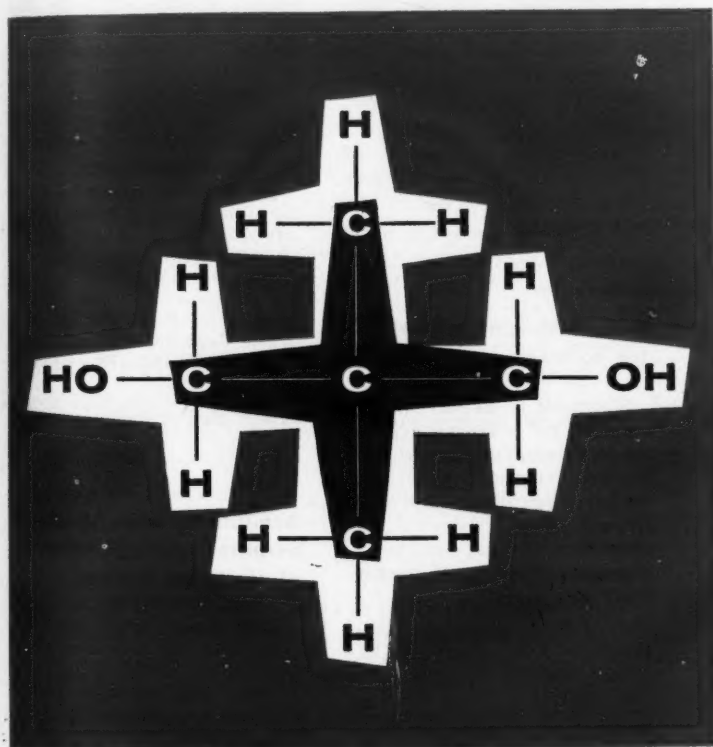
Neopentyl glycol warrants your evaluation if you are interested in developing highly stable polyester plasticizers and resins and polyurethanes of moderate molecular weight.



"Ever work bent over a  
microscope all day?"



# GLYCOL



## Neopentyl Glycol is basis of unique new polymeric plasticizer—

The unusual stability provided by neopentyl glycol in polyesters is exemplified in Eastman's Polymeric Plasticizer NP-10.

NP-10 can be rapidly processed with polyvinyl chloride resins by

virtue of its moderate molecular weight. Its permanence properties, on the other hand, are equal or superior to those of polymeric plasticizers possessing much higher molecular weights.

## Eastman CHEMICAL PRODUCTS, INC.

KINGSPORT, TENNESSEE—subsidiary of Eastman Kodak Company

**SALES OFFICES:** Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Mass.; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast:** Wilson Mayer Co., San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

In polyesters, neopentyl glycol exceeds

other commercial glycols in providing resistance to

- high temperatures
- discoloration
- hydrolysis

Reactive...compact...symmetrical...neopentyl glycol represents an ideal polyol for the production of polyester resins and plasticizers.

Extensive tests have indicated that the stability of polyesters based on neopentyl glycol surpasses polyesters prepared from other commercially available glycols in terms of their resistance to high temperatures, discoloration, hydrolysis and in their excellent electrical properties. This stabilizing influence of the neopentyl structure can be used to advantage in reactions in which this versatile glycol is used alone or in combination with other polyols.

Hydroxy-terminated polyesters derived from neopentyl glycol can be readily reacted with isocyanates to form polyurethanes of unusual thermal stability. Their low color and high resistance to hydrolysis make such polyurethanes particularly attractive in rubber and protective coating formulations.

If you would like to explore the advantages of neopentyl glycol, write for samples and further information.

## Toughness, impact strength in acrylic molding powder

Uses: As modified acrylic molding powder.

Features: Has greater toughness and impact strength, combined with general stability characteristics of acrylics — and at medium price.

Description: Modified acrylic molding powder does not contain plasticizers, has low water absorption, and no unpleasant odor. White and colors are available. Limited quantities can be obtained at 56¢ per lb.

Sp Gr	1.12
Tensile (max, psi)	5200
Flex strength (max, psi)	8000
Heat dist. temp (°F)	
(2°C/min at 66 psi)	194

(Acrylic molding powder is product of Rohm & Haas Co., Dept. CP, Washington Sq., Philadelphia 5, Pa.)

Check 2501 opposite last page.

## Claims superior properties for pesticide carrier

Uses: As pesticide carrier and bulking agent.

Features: According to manufacturer, product has properties superior to any other pesticide carrier for production of wettable powders and high-level concentrates for G.S.A. and W.H.O. specs. It provides cleaner-running mills and better resuspensibility after tropical storage.

Description: Pesticide carrier is a bright white, neutral mineral with high available-sorptive-surface area. Its properties are:

Aver. particle diameter (microns)	0.02
Oil absorption (cc/100 grams)	155-165
pH (20%)	7.0-7.5
Specific gravity	2.05
Form	Powder
Bulk Density —	
Aerated (lbs/cu ft)	3
Packed (lbs/cu ft)	18-20

(Zeolox 7A is product of J.M. Huber Corp., 100 Park Ave., New York 17, N. Y.)

Check 2502 opposite last page.

Check 2500 opposite last page.

# BISONITE'S #957 COATING SYSTEM

*for Superior Corrosion Control*

COATINGS	
CORROSION REPORT	BISONITE "957"
Material	Resistance
Acid	Excellent
Alkali	Good
Solvent	Poor

To prevent Corrosion by and Contamination of  
Food Products      Heavy Chemicals      Beverages  
Oils and Greases      Hot Water  
Salts      Solvents

A thermally cured coating that resists acids, solvents and alkalis

- Permanent adhesion.
- Withstands 72% caustic at 130°C. for prolonged periods.
- Strong • Tough • Flexible.
- Glazed glasslike surface.
- Greater thickness in fewer coats. Reduces cost.
- A NEW Advance in the field of applied coatings.
- Applied by qualified applicators across the nation.



Solves many problems of chemical corrosion. For lining tanks, tank cars, pipes, food containers, storage bins, fans, ducts, hoods, etc. at moderate cost. Made by a company specializing in corrosion resistant coatings. Not a side line. BISONITE products in many cases have corrected conditions when other coatings have failed. Write for descriptive literature. Our nearest approved applicator will be glad to give you coating problems immediate attention.

**BISONITE COMPANY, Inc.**

2246 Military Road  
Buffalo 17, N.Y.

Check 2503 opposite last page.

**Pleasing Odor = More Sales**  
**consider resodors\*!**

**RUBBER**

**PLASTICS**

A soft talc odor helps sell baby pants. A soap-fresh fragrance adds buy-appeal to shower curtains. Hand bags with a simulated leather odor have a real competitive advantage.

Perhaps an appealing odor—or freedom from objectionable odor—is just what your product needs!

SINDAR can give you expert assistance. Our RESODORS were specifically



developed for use in plastics and rubber. They are easy to use—just add the oil at any convenient point in your process. They'll stand up under your temperatures too.

There's a RESODOR to give your product exactly the right odor appeal. May we send you samples and put our experience to work for you?

\*Reg. U.S. Pat. Off.

**SINDAR** Corporation  
Industrial Aromatics and Chemicals

330 West 42nd Street • New York 36, New York

Check 2504 opposite last page.

## CHEMICAL MATERIALS

### Restores cyanide electroplating solutions

**Uses:** To restore contaminated cyanide electroplating baths to full production.

**Features:** Carbonates, sulphates, and chromates are removed through preferential precipitation, effected on molar basis. Three ounces of restorer removes one ounce of sulphate or carbonates, and will supply about 1.35 ounces of metallic silver. Free cyanide content of bath is undisturbed.

**Description:** Restorer consists of patented formulation of barium double-metal cyanides or barium in combination with other cyanide electrolytes.

(Pur-A-Salts is product of Precious Metals Div., Sel-Rex Corp., Nutley, N.J.)

Check 2505 opposite last page.

### Steroid starting material for hormone synthesis

Sitosterol, a steroid starting material for hormone synthesis, is now in commercial production. Suggested uses: Synthesis of hormones, anti-cholesterol drugs, ointments, insecticides, lotions, cosmetics, pharmaceuticals, and veterinary medicine.

(Information on sitosterols is available from Chemical Division, General Mills, Kankakee, Illinois.)

Check 2506 opposite last page.

### Titanium chloride pair seen as promising isotactic catalysts

Available in multi-pound quantities, titanium dichloride and trichloride are considered promising catalysts for isotactic polymerization of unsaturated hydrocarbons, such as ethylene, propylene and butene. Both materials are free-flowing, dark purple, crystalline powders. Introductory prices of \$5 to \$10 lb, depend-

ing on quantity, have been established for titanium trichloride, and \$15 lb for the dichloride.

(Titanium dichloride and trichloride are available from Metal Div., The New Jersey Zinc Co., 160 Front St., New York 38, N.Y.)

Check 2507 opposite last page.

### Increase killing power of slime controller

**Uses:** For general microbiological control in pulp and paper mills, and for microbiological slime and algae control in recirculating cooling water systems.

**Features:** Penetrating and dispersing agents substantially increase killing power.

**Description:** Slime control agent is stable solution of an effective blend of chlorinated phenols with dispersants, in suitable solvents.

(Nalco 201 is product of National Aluminate Corp., Dept. CP, 6294 W 66th Pl., Chicago 38, Illinois.)

Check 2508 opposite last page.

### Availability of pure silicon permits volume production of electronic devices

New process made available to American manufacturers

**Uses:** For nation's defense activities where smaller, lighter, and more powerful electronic assemblies are needed; for radio and television equipment where electronic tubes may be replaced; for industrial controls where high-temperature operation is necessary; and for alternating current, ignition, and fuel control systems in automobiles.

**Features:** Production of ultra-pure silicon permits large volume of production of solid-state devices having two to four times the voltage and power handling capacities of those presently in use.

**Description:** Experimental

transistors made with Siemens-Westinghouse ultra-pure silicon have provisional ratings of 300v, 20 amps, and a gain of 10 to 15 db. (Some of the best silicon transistors available now carry ratings of 60v, 2 amps, with a gain of 10 to 15 db.) Rectifiers with top voltages of 600v have been produced with this material.

It is possible to regularly produce units of 1000v or better. Single crystal properties of ultra-pure silicon range from 400 to 1000 ohm-centimeters resistivity with a lifetime of 400 to 800 microseconds. (This is better than most commercially available material by a factor of 5.)

Manufacturer will license other companies in this country for production of ultra-pure silicon, under arrangement with the Siemens companies in Germany.

(Ultra-pure silicon is made by Siemens-Westinghouse technique. More information on process is available from Westinghouse Electric Corp., PO Box 2278, Pittsburgh, Pa.)

Check 2509 opposite last page.

### Nitrogen efficiency of blowing agent believed highest

Hydrazine-derived agent is safe to handle

Uses: As blowing agent for rubber and plastics.

Features: When properly compounded in rubber, agent is believed to provide highest nitrogen efficiency of all hydrazine-derived blowing agents on market. It is non-toxic, safe-to-handle, and will not support combustion. Agent produces odorless, non-staining, non-discoloring closed-cell sponge of low density with an extremely fine and uniform cell structure.

Description: Blowing agent is based on hydrazine. It is now in commercial production.

(Kempore R-125 is product of National Polychemicals, Inc., Wilmington, Mass.)

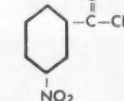
Check 2510 opposite last page.

## BRIEFS for buyers of

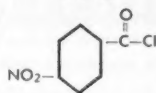
### Where to go for chloro aromatics

If your processing requires use of the benzyl, benzoyl, or nitrobenzoyl groups, you'll find Hooker a convenient source of supply for intermediates.

Two products in point:



m-Nitrobenzoyl Chloride



p-Nitrobenzoyl Chloride

**meta-Nitrobenzoyl chloride**, a mixture of isomers containing not less than 92% m-nitrobenzoyl chloride. It is used as an intermediate in dyes for fabrics and color photography, and in preparation of pharmaceuticals.

**para-Nitrobenzoyl chloride**, a yellow crystalline material in flake form, assaying 98% by weight min. purity. It is used as an intermediate in manufacture of azo and stilbene dyes, and in pharmaceuticals such as folic acid and novocain.

Your Hooker salesman will gladly tell you more about these and other chloro aromatics—readily available in quantities as small as 5 gallons and, in some cases, by tank wagon or tank car.

### Thoughts on choosing a chlorate supplier

What do purchasing men look for when choosing a supplier of production chemicals?

Quality, service, price—of course. Reputation; what other buyers say is important. What other buyers do can be even more significant.

Two cases in point are these chemicals, both of which we produce:

**Sodium chlorate** (OLDBURY®) has proved its versatility in dozens of ways. A strong oxidizing agent, it's used in metallurgy, in dye manufacture, in chemical synthesis.

Farmers in many states use it successfully for weed control. In the Deep South, it defoliates cotton to make the bolls easier to pick with machines.

And now, 36 pulp mills are using sodium chlorate processes for generating chlorine dioxide, bleaching agent for high-strength high-brightness pulp.

**Potassium chlorate** (OLDBURY), also an oxidizing agent, has just one major use. A little of it goes into the heads of three out of every five safety matches made in this country.

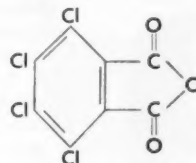
Despite their chemical kinship, it would be hard to find two products farther apart in utilization.

They're very much alike, though, in one important respect: the preference of the men who buy them. In both cases, more purchasing men specify OLDBURY than all other brands combined.

It takes a lot of doing to merit confidence like this. Some of the things we do may be the things you look for in a supplier—whether it's for a special-use item like potassium chlorate, or a big-tonnage commodity like sodium chlorate.

### Heat-stable intermediate makes plastics resist fire

If you want to build heat stability into a plastic product, take a good look at this molecule of tetrachlorophthalic anhydride, trade-named NIAGATHAL®.



Nearly half its weight is concentrated in four chlorine atoms, providing a very stable compound that won't melt unless you heat it to 254°-255°C.

Translate these properties to read "fire resistance," "heat resistance,"

## Chloro Aromatics Sodium Chlorate Potassium Chlorate Plastics Intermediates Sodium Tetrasulfide

"good electrical qualities"—if, for example, you're adding NIAGATHAL to a polyester resin.

It's most effective in polyesters containing pigment or other filler—lets you load as much as 22% stable chlorine into such resins. When you do this, you come up with a polyester that is inherently, permanently self-extinguishing.

To help you evaluate this chemical, we've put together, in bulletin form, several published papers reviewing its properties and solubilities, its many reactions and suggested uses, as well as suggested uses of derived compounds. To get a copy, just check the coupon for Bulletin 46.

### Sodium tetrasulfide

For years we've been telling leather tanners about the virtues of Hooker sodium tetrasulfide, Na<sub>2</sub>S<sub>4</sub>, as a soaking agent for hides.

If soaking hides is out of your line, here are just a few of the other tasks this chemical can do or is doing:

1. Reducing agent for organic nitro bodies
2. Ore flotation reagent
3. In manufacture of sulfur dyes
4. In preparation of metal sulfide finishes

Hooker sodium tetrasulfide comes to you, in 55-gallon steel drums, as a clear dark-red aqueous solution containing 40% by weight of Na<sub>2</sub>S<sub>4</sub>, and less than 1% of other sodium salts. For complete information, check the coupon.

For more information on chemicals mentioned on this page, check here:

- |   |  |
|---|--|
| <input type="checkbox"/> meta-Nitrobenzoyl Chloride | <input type="checkbox"/> NIAGATHAL (Tetrachlorophthalic anhydride)—Bulletin 46 |
| <input type="checkbox"/> para-Nitrobenzoyl Chloride | <input type="checkbox"/> Sodium Tetrasulfide                                   |
| <input type="checkbox"/> Sodium Chlorate            | <input type="checkbox"/> New list of products—Bulletin 100-A                   |
| <input type="checkbox"/> Potassium Chlorate         |  |

Clip and mail to us with your name, title, and company address.

(When requesting samples, please use business letterhead.)

### HOOKER ELECTROCHEMICAL COMPANY

512 FORTY-SEVENTH STREET, NIAGARA FALLS, N. Y.

Niagara Falls Tacoma Montague, Mich. New York Chicago  
Los Angeles Philadelphia Worcester, Mass.  
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

**HOOKER**  
CHEMICALS  
PLASTICS

Check 2511 opposite last page.



**"NOSEY" says:**

HERE'S good news for folks who're faced with air contamination problems resulting from the decomposition of protein materials, like fat renderers, and the operators of sewage disposal plants and city dumps. That good news is PütROL\*—a powerful, low cost, very effective deodorizing concentrate made by FRITZSCHE for the masking of putrefaction odors. There's lots of good will and favorable community relations to be gained by using PütROL for such purposes and you'll not go wrong requesting samples 'n suggestions for its most efficient use.

\*Reg. Trade Mark

**FRITZSCHE**  
*Brothers, Inc.*

PORT AUTHORITY BUILDING, 76 NINTH AVENUE, NEW YORK 11, N. Y.

BRANCH OFFICES and \*STOCKS: Atlanta, Ga., Boston, Mass., \*Chicago, Ill., Cincinnati, O., \*Los Angeles, Calif., Philadelphia, Pa., San Francisco, Calif., St. Louis, Mo., Montreal and \*Toronto, Canada and \*Mexico, D. F. FACTORY: Clifton, N. J.

Check 2512 opposite last page.

**PREFERRED FOR POLISHES**

**Tamms**

Tamms products are widely used in the polish trade, preferred for quality results.

**TAMMS SILICA**  
Soft Amorphous Type  
Grades to meet various abrasive requirements... for all kinds of metal polishes.

**TAMMS MULTI-CEL**  
Diatomaceous Earth  
Top grade, ground extremely fine... a milder abrasive than silica. Best for silver polish.

**TAMMS TRIPOLI**  
Rose and Cream Colors  
Once-ground, double-ground and air-float... ideal grades for buffing and polishing. Also rubbing compounds.

**TAMMS BENTONITE**  
(Suspension Medium)  
A very finely ground colloidal clay... wholly soluble. Absorbs five times its weight in water.

Write today for prices and samples.

DEPT. RM2B  
**TAMMS INDUSTRIES, INC.**  
228 N. LA SALLE ST., CHICAGO 1, ILL.

Check 2513 opposite last page.

## CHEMICAL MATERIALS

### Calcium Indicator

Direct EDTA titration of calcium at pH above 12, even in presence of magnesium, is permitted by indicator, the sodium salt of 1-(2-hydroxy-1-naphthylazo)-2-naphthol-4-sulfonic acid.

(Calcon (CI 202) is product of J. T. Baker Chemical Co., Phillipsburg, N. J.)

Check 2514 opposite last page.

### 'Popcorn' type product for rubber compounding saves time, trouble

Uses: For simplified rubber compounding and processing of shoe soles, floor tiling, and hard extruded items.

Features: Product is ready-to-use, equally proportioned, dustless, free-flowing material which may be processed as received. Weighing, handling, and compounding time is substantially shortened. Rapid breakdown speeds banbury and mill mixing cycles.

Description: Material which is equally proportioned master batch of Good-rite 2007 and cold non-staining GR-S is supplied in the form of a crumb similar in appearance to popcorn. It ends loss of a separately used reinforcing resin during handling and in worn equipment, according to company.

(Good-rite 2057 is product of B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, Ohio.)

Check 2515 opposite last page.

### Soviet catalysis research

Comprehensive collection of English translations of papers on various aspects of catalysis research, selected from Soviet chemical journals for the years 1949-1955, comprises 1672 pages, 262 papers, costs \$200. All tabular and diagrammatic material is reproduced. "Soviet Research in Catalysis" — Consultants Bureau, 227 West 17th St., New York 11, New York.

## Another use for activated carbon

# HCl purification

Activated carbon removes contaminants from hydrochloric acid.

Whether you buy, produce, or sell, you can upgrade your HCl to meet current high purity requirements.

Samples available; ask for our Bulletin No. 19.



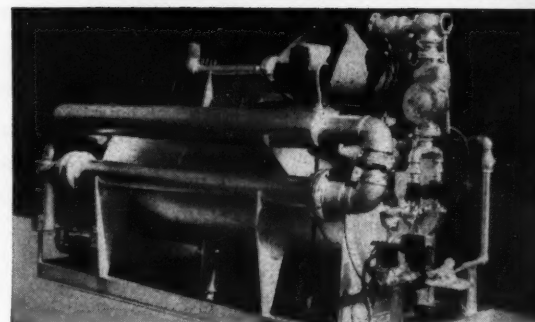
ACTIVATED CARBON is the modern Alchemist that removes impurities from gases and liquids by the black magic of adsorption.

ACTIVATED CARBON  
Purification & Recovery Equipment  
**BARNEBEY-CHENEY**

CASSADY AT EIGHTH COLUMBUS 19, OHIO  
Los Angeles • San Antonio • St. John's, Quebec

Check 2516 opposite last page.

## 3 Basic Types Of STRAUB GAS GENERATORS



■ Fully automatic STRAUB Gas Generators are available in three basic types — Exothermic, Endothermic and Nitrogen. Built to produce inert or equilibrium gases to protect your plant, product or process.

Compact and rugged, they feature a special precision compressor-carburetor system which permits highly accurate and uniform control of the gas produced. If your process calls for low cost controlled atmosphere, be sure you check STRAUB.

Complete Catalog. Get your copy of this descriptive catalog.

**A. A. STRAUB COMPANY, INC.**  
4930 Grayton Rd. • Cleveland 11, Ohio

Check 2517 opposite last page.

CHEMICAL PROCESSING

**USP calcium carbonate  
by the ton**

**Uses:** For antibiotics, pharmaceuticals, and other products requiring high purity calcium carbonate.

**Features:** USP grade calcium carbonate is available in large-scale, commercial quantities.

**Description:** Although company has been producing calcium carbonates for paint, plastics, rubber, printing ink, and other industries since 1925, this marks entry into manufacture of premium grade of calcium carbonate. Product is available in 50-lb multiwall paper bags.

(USP grade calcium carbonate is available from Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio.)

Check 2518 opposite last page.

**Organoleptic qualities  
substantially improved  
in anethole product**

**Uses:** For perfumes and flavors.

**Features:** Product possesses substantially improved organoleptic qualities. Its olfactory value has also been greatly improved as it is completely free of cis-anethole, methyl chavicol, terpineol and other alcohols.

**Description:** Anethole, USP, XV Extra, is available in commercial quantities.

(Extra grade anethole is product of Southern Chemical Div., The Glidden Co., PO Box 389, Jacksonville 1, Fla.)

Check 2519 opposite last page.

**Silicone rubber uses**

Electrical insulating advantages of manufacturer's silicone rubber are discussed in four-page bulletin. Dielectric properties of material at temperatures ranging from 25 to 250°C are tabulated. Form 9-105 — Dow Corning Corp., Midland, Michigan.

Check 2520 opposite last page.

**HYDRAZINE MONOHYDROCHLORIDE**

Technical; 95%  $N_2H_4$  HCl min.

White crystalline flake; 57 lbs./cu. ft.; approx. melting point 87° to 92° C.; decomposes at about 240° C.; soluble at 20° C. 37 gms./100 gms. water; somewhat soluble in lower alcohols; insoluble in most organic solvents.

**BETA-HYDROXYETHYLHYDRAZINE**

Technical; 70%  $HOCH_2CH_2NHNH_2$  min.

Colorless, slightly viscous liquid; 9.26 lbs./gal.; 1.11 gms./cc. at 20° C.; freezing point of 70% concentration below -70° C.; boiling range 145° to 153° C. (25 mm. Hg.); flash point 224° F.; completely miscible with water; soluble in lower alcohols; slightly soluble in ether.

**HYDRAZINE ANHYDROUS**

Technical; 95%  $N_2H_4$  min.

Colorless, mobile liquid; 8.38 lbs./gal. at 25° C.; melting point 2° C.; boiling point 113.5° C.; completely miscible with water and methanol; flash and fire point 126° F. (open cup).

**THIOSEMICARBAZIDE**

$NH_2NHCSNH_2$ ; 99% min. assay

Free-flowing white crystals; ash content less than 0.05%; soluble in hot water.

**HYDRAZINE SOLUTION**

64.0%  $N_2H_4$  min.

Colorless, mobile liquid; 8.61 lbs./gal. at 25° C.; melting point -51.7° C.; boiling point 120.1° C.; completely miscible with water and methanol; flash point 163° F.; fire point 166° F. (open cup).

**DIHYDRAZINE SULFATE**

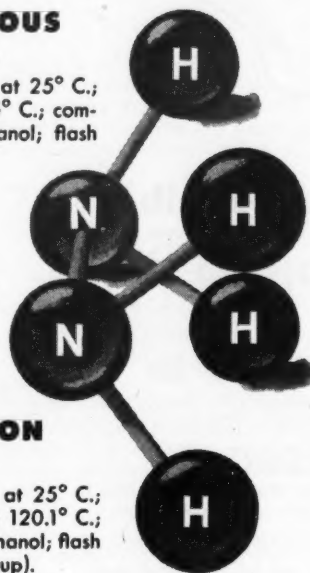
Technical; 95%  $(N_2H_4)_2 \cdot H_2SO_4$  min.

White crystalline flake; 55 lbs./cu. ft.; melting point 104° C. approx.; decomposes at about 180° C.; soluble at 25° C. 202 gms./100 gms. water; relatively insoluble in most organic solvents.

**HYDRAZINE SOLUTION**

54.4%  $N_2H_4$  min.

Colorless, mobile liquid; 8.59 lbs./gal. at 25° C.; melting point -57° C.; boiling point 119.8° C.; completely miscible with water and methanol; flash point 193° F.; fire point 204° F. (open cup).



**MATHIESON'S  
hydrazine  
family**

As an exceptionally effective *reducing agent*, *oxygen scavenger*, and *nitrogen "building block,"* hydrazine is finding an ever-increasing number of uses.

To increase its range of use, promote ease of handling, simplify processing and storage problems, Mathieson hydrazine is now commercially available in several forms and in a number of derivatives.

See your Olin Mathieson representative soon for full information on the many ways in which Mathieson hydrazine and derivatives can improve your operations.

Mathieson hydrazine is manufactured at Lake Charles, Louisiana, and is available from Lake Charles, and Rochester, New York.

**MATHIESON CHEMICALS**

OLIN MATHIESON CHEMICAL CORPORATION  
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.



Ammonia • Bicarbonate of Soda • Carbon Dioxide • Caustic Potash • Caustic Soda • Chlorine • Ethylene Diamine • Formaldehyde  
Hexamine • Hydrazine and Derivatives • Hypochlorite Products • Methanol • Muriatic Acid • Nitrate of Soda • Nitric Acid  
Polyamines • Soda Ash • Sodium Chlorite Products • Sodium Methylate • Sulfate of Alumina • Sulfur (Processed) • Sulfuric Acid

Check 2521 opposite last page.

3304

# DOW CORNING SILICONE DEFOAMERS



have proved their efficiency and versatility in countless applications. For example:

**1 OUNCE KILLS FOAM IN . . .**

**625,000 lb**  
sodium bromide crystallization solution

**250,000 lb**  
molasses, vat dye solution, trioxide pickling solution, tall oil

**125,000 lb**  
phenolformaldehyde, urea formaldehyde, asphalt, starch sizing

**62,500 lb**  
soft drinks, 70% caustic liquor, black liquor, sulfuric acid pickling bath

Just a few drops of a Dow Corning SILICONE DEFOAMER can prevent mountains of foam . . . enabling you to utilize full productive capacity and put your processing into high gear. What's more, when you control foam, you eliminate the mess and waste of boilovers. Whatever your foaming problem, a Dow Corning SILICONE DEFOAMER will help solve it at amazingly low cost.

## FREE SAMPLE and INFORMATION—

To receive a generous trial sample of a Dow Corning Silicone Defoamer, return coupon below or write on your letterhead. No obligation, of course.



**Dow Corning CORPORATION**  
MIDLAND, MICHIGAN

NAME _____			3224	<i>My foamer is</i> Oil system _____ Aqueous system _____ Food products _____ Other _____
TITLE _____				
COMPANY _____				
CITY _____	ZONE _____	STATE _____		
_____				

Check 2522 opposite last page.

## CHEMICAL MATERIALS

### Commercial quantities of para-Cresol 98.5% pure

**Uses:** As intermediate in manufacture of dyestuffs and color pigments; for production of antioxidants for aviation and motor gasolines, oils, rubber, detergents, waxes, and food products.

**Features:** Product is commercially available, has a purity of over 98.5%.

**Description:** Availability of large quantities of high-purity para-Cresol at economical cost opens up new opportunities for application of chemical.

(para-Cresol is product of Pigment, Color & Chemical Div., The Sherwin-Williams Co., 260 Madison Ave., New York 16, N.Y.)

Check 2523 opposite last page.

### Sodium bisulfite: reducing agent

Anhydrous sodium bisulfite, a reducing agent, is now available in tech., CP, agricultural, and photo grades from manufacturer's new plant.

(Anh. sodium bisulfite is a product of Virginia Smelting Co., Dept. CP, West Norfolk, Virginia.)

Check 2524 opposite last page.

### Rigidity, impact strength, shock fracture resistance — styrene resin qualities

**Uses:** Modified high-impact polystyrene permits production economy in vacuum forming.

**Features:** High rigidity permits production of thinner door liners and often eliminates need for liner reinforcements. High impact strength, even at sub-zero temperatures, indicates excellent resistance to fracture by shock. High heat stability enables fabricators to obtain better surface appearance. Good initial color and stability pro-

notes color uniformity and elimination of streaking.

**Description:** Rubber-modified styrene resin has an elongation of 30% in extruded sheet. Recycling is possible in an extruder, allowing re-use of clean trim. Material is compatible with other impact styrenes.

(TGD-6000 is product of Bakelite Co., Div. of Union Carbide Corp., 260 Madison Ave., New York 16, N. Y.)

Check 2525 opposite last page.

### Superior film properties make emulsion stand out in paper coating field

**Uses:** For applications with adhesives, textile coatings, paper coatings, saturants, and binders.

**Features:** Material offers superior qualities of adhesion, flexibility, transparency, non-toxicity, and water-resistance.

**Description:** Emulsion is copolymer of vinyl acetate and vinyl stearate.

(Flexbond 100 is product of Colton Chemical Co., Div. of Air Reduction Co., Inc., Dept. CP, 1747 Chester Ave., Cleveland 14, Ohio.)

Check 2526 opposite last page.



"It's very thoughtful of you to prevent the spread of your cold!"

Thanks to Harold Money, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

## CHEMICAL PROCESSING



### Bonds Dacron, nylon to elastomers

Tensile strength of fabric not degraded

**Uses:** For bonding of fabrics to rubber for diaphragms, belting, hose, air springs, and related units.

**Features:** Material bonds Dacron and nylon to uncured natural rubber, GR-S, neoprene, butyl, and Buna-N elastomers. It is first high-strength adhesive for Dacron. Adhesive does not degrade the high tensile strength of fabric in finished product. It has excellent flex-life characteristics.

**Description:** Adhesive consists of solution of polymeric constituents and dispersed pigments in non-flammable, organic solvent. It is mixed on the job with an isocyanate curative. A single coat is sufficient when parts are to be bonded within two to three days.

Room temperature strip adhesion values exceed 100 pounds per linear inch depending upon strength of the elastomer compounds.

(Chemlok 401 is product of Special Products Div., Lord Manufacturing Co., 1635 West 12th St., Erie, Pennsylvania.)

Check 2527 opposite last page.

### Plastics — new uses

Lists products made of urea, melamine and alkyd molding compounds, and nylon molding extrusion compounds. New products, uses, and markets are suggested. Plaskon bul P-95 — Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N.Y.

Check 2528 opposite last page.

### Quaternaries

16-page bulletin on quaternary ammonium salts covers chemical, physical characteristics and applications. "Arquads" — Chemical Div., Armour & Co., 1355 W. 31st St., Chicago 9, Ill.

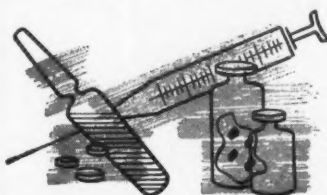
Check 2529 opposite last page.

# Which New CO<sub>2</sub> Application Will Help You Most?

"CO<sub>2</sub> applications are unlimited" ... a broad statement, but literally true. New ways in which this most versatile of all gases is improving products, cutting costs and saving time and labor are being developed almost daily. Some of the applications discussed here will be of direct, primary interest to you. Other uses, while perhaps not in your immediate specialty, may well be *adaptable* to your field. Check the box by each application on which you'd like detailed, technical data and mail to:

**LIQUID CARBONIC**  
Division of General Dynamics Corporation  
3100 South Kedzie Avenue • Chicago 23

Your inquiry will receive prompt, professional attention from the chemical applications staff of the world's largest producer of CO<sub>2</sub>.



☐ **Economical, Efficient "Freeze-Drying"**—Freeze-drying is used to dehydrate heat sensitive substances at low temperatures. In the processing of blood plasma and the manufacture of penicillin, streptomycin and other pharmaceuticals, dry ice or liquid CO<sub>2</sub> is used to freeze the item being dried. Also, during the drying stage, dry ice is used to condense the moisture as it is sublimed under vacuum. Capable of quickly attaining and maintaining the extreme low temperatures required, CO<sub>2</sub> has the added advantage of requiring only a small capital outlay.

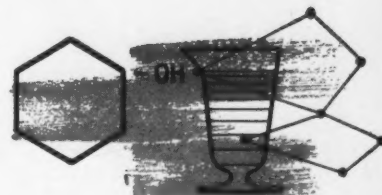


☐ **Precipitation of Carbonates**—Carbon dioxide in its gaseous form is used to

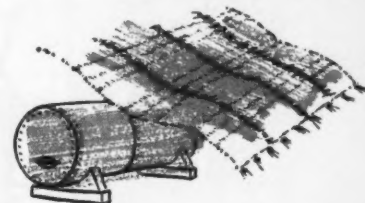
precipitate carbonates from water solutions. Ammonium bicarbonate and lead carbonate are examples. Bakeries and plastics manufacturers are among the many users of ammonium bicarbonate.



☐ **Simplifies Pulverizing of Materials With Low Melting Point**—Many substances tend to melt or smear because of the heat generated in a milling process. DDT and vegetable fat flakes which are waxy and Teflon resin which is very tough and elastic are examples. In the low temperature pulverizing process the ingredient is mixed with crushed dry ice or low pressure carbon dioxide liquid is injected directly into the ingredient. These methods effectively inhibit the melting or smearing, prevents plugging and reduces horse power requirements. Gaseous carbon dioxide is also used to form an atmospheric "blanket" to effectively prevent fire during the grinding of flammable materials. An example of this application is the grinding of phosphorus pentasulphide and flammable resin materials.



☐ **Fireproof "Blanket" For Stored Phenol**—Phenol is a toxic, corrosive, flammable compound and is stored in an inert atmosphere under slight pressure to reduce vaporization, prevent oxidation and at the same time provide a non-flammable atmosphere. Carbon dioxide is also used as a pressure medium in transferring liquid phenol.



☐ **Effective Inerting Agent**—There are many times when an inert atmosphere is needed to prevent fire or explosion. Before welding a tank that has been used for the storage of flammable liquid, CO<sub>2</sub> is used to inert the atmosphere in the tank so that welding can be done with no danger of explosion. CO<sub>2</sub>, acting as an effective atmospheric "blanket," also prevents oxidation and "skinning" of paints and oils.

### SEND IN THIS PAGE FOR COMPLETE INFORMATION

Check off the applications which interest you, fill in the mailing information below, and mail this page to The Liquid Carbonic Corporation for prompt information. You'll also receive a free copy of our Booklet "Applications Unlimited," which covers dozens of other important uses for CO<sub>2</sub>.

<p>World's Largest Producer of</p> <p><b>LIQUID CARBONIC</b></p> <p>DIVISION OF GENERAL DYNAMICS CORPORATION</p> <p>Chicago 23, Illinois</p>		<p><b>LIQUID CARBONIC</b></p> <p>DIVISION OF GENERAL DYNAMICS CORPORATION</p> <p>3100 South Kedzie Ave., Chicago 23, Illinois</p>	
NAME _____		COMPANY _____	
TITLE _____		ADDRESS _____	
CITY _____		ZONE _____ STATE _____	

Check 2530 opposite last page.



Check 2531 opposite last page.

## CHEMICAL MATERIALS

### Piperazine now available in crystalline form

Widely used in production of tranquilizing drugs and deworming agents, piperazine is now commercially available in free-flowing, anhydrous, crystalline form. Principal advantages of flake form are ease of handling and its exceptionally high purity (98%).

(Piperazine flake is product of Union Carbide Chemical Co., Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.)

Check 2532 opposite last page.

### Plasticizer processing and handling improved

**Uses:** As a plasticizer of high permanence for vinyl chloride polymers, especially for applications where freedom from exudation on high humidity exposure is required.

**Features:** Material has very good processing and handling properties. Plasticizing efficiency is improved and greater resiliency is imparted to vinyl compounds. It has low-temp flexibility and resists soapy water.

**Description:** Polymer plasticizer is a clear liquid, and has these physicals:

Acid number (mg KOH/gm)	2 max
Color (varnish scale)	5 max
Viscosity (Gardner-Holdt @ 25°C)	Z <sub>1</sub> - Z <sub>1</sub>
Specific gravity (@ 25°C)	1.084
Freezing point (°C)	+4

(Paraplex G-54 is product of Rohm & Haas Co., Washington Sq., Philadelphia 5, Pennsylvania.)

Check 2533 opposite last page.

### Silicone rubbers

Six-page illustrated bulletin thoroughly details physical properties of silicone rubber. Applications are shown. Form 9-106—Dow Corning Corp., Midland, Mich.

Check 2534 opposite last page.

new perspectives  
in alkali metal salts



## Now! RUBIDIUM and CESIUM SALTS available for evaluation

American Potash & Chemical Corporation—basic in the salts of all five alkali metals—now offers Rubidium and Cesium salts at substantially reduced prices. Immediate availability of these interesting compounds... most highly reactive of the alkali metals... permits their evaluation for wider industrial use. We offer the following compounds for your consideration:

<b>RUBIDIUM:</b>	Carbonate (Rb <sub>2</sub> CO <sub>3</sub> ); Sulphate (Rb <sub>2</sub> SO <sub>4</sub> ); Chloride (RbCl); Fluoride (RbF).
<b>CESIUM:</b>	Carbonate (Cs <sub>2</sub> CO <sub>3</sub> ); Sulphate (Cs <sub>2</sub> SO <sub>4</sub> ); Chloride (CsCl); Fluoride (CsF).

**TRONA**

For further information call your nearest Trona representative, or write

MARKET DEVELOPMENT DEPT.

**American Potash & Chemical Corporation**

3030 West Sixth Street  
Los Angeles 54, Calif.  
DUckirk 2-8231

99 Park Avenue  
New York 16, N.Y.  
OXford 7-0544

\*TRADEMARK AP&CC

Check 2535 opposite last page.

CHEMICAL PROCESSING



THAT'S  
INTERESTING

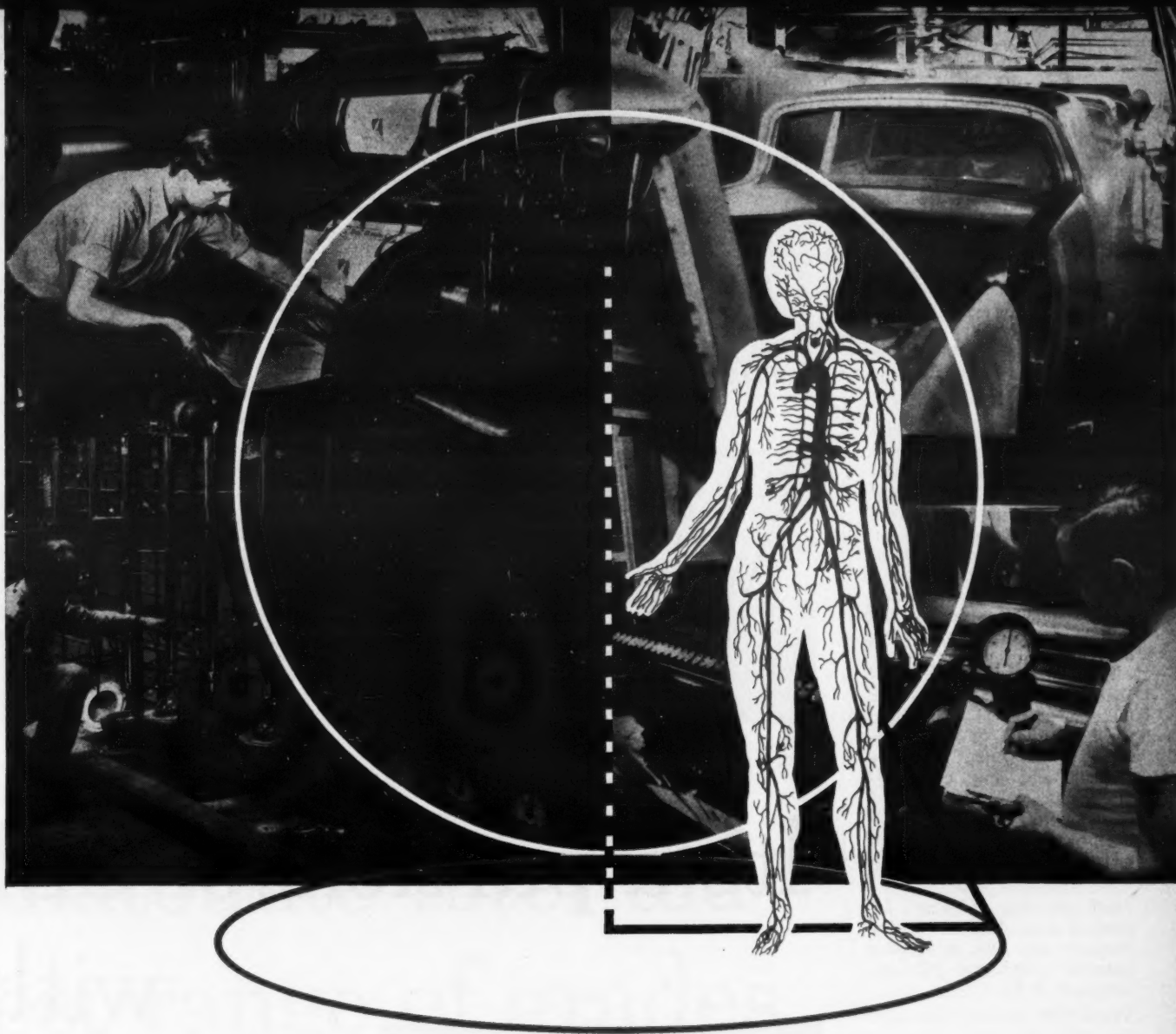
### 'Poppit' models

"Poppit" beads, the pull-apart beads popular with the ladies, are helping scientists to determine chemical structures of complicated substances. Simple molecular models, readily made from beads in a variety of colors, are valuable tools in research and visual teaching aids. Beads are supplements, not substitutes, for standard atom models.

### Atomic heart aid

Another peaceful job for the powerful atom has been described in a report of Air Force-sponsored aeromedical research. Injected doses of radio-ionated human serum albumin provides a simple, highly accurate technique for determination of cardiac output under stress and response to medications. Test is reproducible to about 6%.

For more information on product at right, specify 2536 see information request blank opposite last page.



## SOLVENTS ... industry's life-giving fluids

When organic coatings and printing inks have places to go, like on automobile bodies and printing presses, it's the job of their oxygenated solvents to take them there and apply their films. Then, these remarkable vehicles evaporate at the precise rate required for the particular end use.

Celanese, a leading supplier of these industrial solvents, is conducting a continuing study into the problems of industry so that solvents of even greater usefulness and economy can be developed. This program has already produced an important family of specialized solvents for the paint and coatings industry. Manufacturers can now replace costlier fluids with

lower cost solvents that offer greater dissolving power, better flow, superior blush resistance, improved all-around performance. Special attention is even paid to the correct flash point.

Researching into the problems of industry... applying the findings to practical solutions to improve manufacturing efficiency... this is another example of Celanese research and product development teams working hand-in-hand to supply industry with basic and intermediate materials that meet specific requirements. Celanese Corporation of America, Dept. 591-L, Chemical Division, 180 Madison Ave., N. Y. 16. Celanese® Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16

#### Basic reasons .....

Acids	Functional Fluids	Polyols
Alcohols	Gasoline Additives	Plasticizers
Aldehydes	Glycols	Salts
Anhydrides	Ketones	Solvents
Esters	Oxides	Vinyl Monomers



#### ..... for improved products

Agricultural	Paper
Automotive	Pharmaceutical
Aviation	Plastics
Building	Surface Coatings
Electrical	Textiles



**Sanitizing paint additive kills bacteria and fungi**

Lasts for life of the paint, needs no special handling

**Uses:** When added to paints, compound gives long-lasting killing action against fungi and bacteria that come in contact with the painted surfaces. It can also be used in vinyl plastics, waxes, and paper coatings.

**Features:** The self-sanitizing additive is effective in most types of paint formulations, lasts for the life of the paint, and requires no special precautions in handling.

Big use of these coatings will be in hospitals, food processing and storage plants, stores and restaurants, and buildings plagued by mildew and allergy-producing fungi.

**Description:** Called Nuozene, additive is a non-toxic triazine. Chemical designation is 2,4-dichloro 6-(o-chloro-anilino)-s-triazine. It is a powder, and may be introduced into the paint as part of the normal pigment-grinding procedure. It may also be added as a water or solvent dispersion.

(Self-sanitizing agent for paint is a product of Nuodex Products Co., Div. of Heyden Newport Chemical Corp., Elizabeth, N.J.)

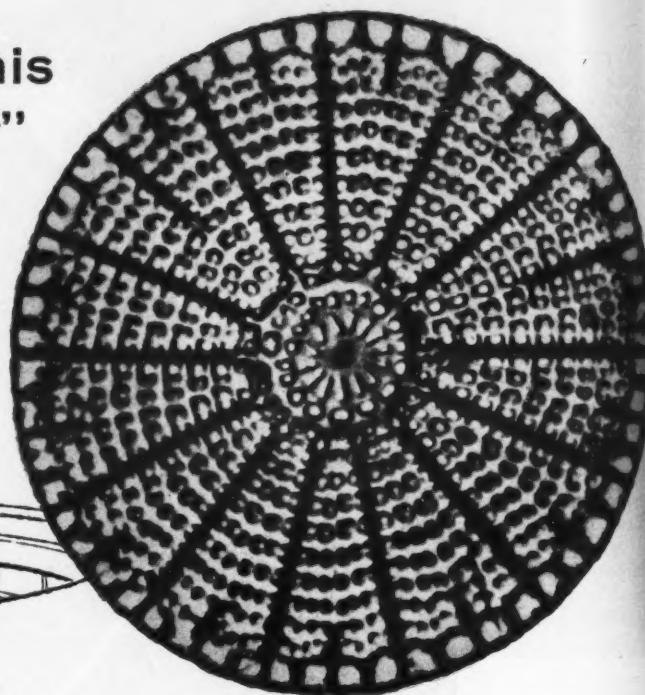
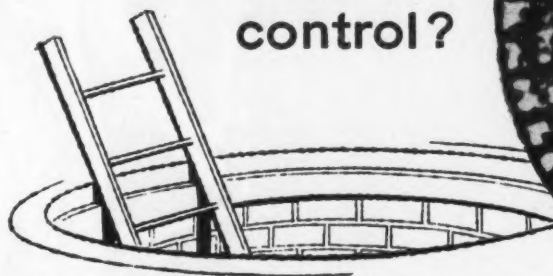
Check 2537 opposite last page.

**Versatile diborane in commercial quantities**

**Uses:** As an intermediate, reducing agent, catalyst, and flame speed accelerator.

**Features:** Metal boride films, formed by decomposition at 700°C, have increased the hardness of some metal surfaces. Polymerization of ethylenically unsaturated compounds such as methyl methacrylate, vinyl acetate, chlorotrifluoroethylene, and butadiene, is catalyzed by diborane. Cure for silicone and other synthetic rubbers is accelerated. Many reactions of diborane can be generalized as

What's this  
"manhole cover"  
got to do with  
more accurate  
filtration  
control?



THIS "MANHOLE COVER" is really a magnification of *Arachnoidiacus ornatus*, one of the hundreds of different intricate particles that make Celite such an effective filter aid.

It's a particle of CELITE -t  
with the v



The photomicrograph at left shows the wide variety of particle shapes and sizes in a typical Celite sample. By carefully controlling the proportions of particle sizes, the most complete range of grades is obtained.

**Johns-Manville CELITE** D

Celite's  
different fi  
include va  
polishing a

Need m  
Celite  
tration m  
Then u  
there ar  
plus ma  
for spec  
Celite,  
balance  
your pr  
omite g  
of grade  
Celite  
tant a



Celite's wide range of grades permits precise control of several different filtration operations in the brewing of beer and ale. These include various ruh beer filtrations, wort filtration, final beer polishing and purification of brewing and bottle wash waters.



In industry's modern research laboratories, Celite filtration has proved itself an indispensable tool. Special grades of Celite have been developed that are particularly effective in analytical methods requiring filtration or chromatographic study.



In the manufacture of lubricating oils, Celite filter aids completely remove bleaching clay from the oil itself and also clarify the many additives used by the industry.

E  
e

# -the diatomite filter aid widest range of grades

Need maximum clarification? Use Celite\* Filter-Cel. Or does your filtration require the fastest flow rates? Then use Celite 545. In addition, there are 7 more intermediate grades plus many special grades produced for specific applications. Thus, with Celite, you can establish the exact balance of clarity and flow rate that your process requires. No other diatomite gives you such a wide choice of grades.

Celite also gives you other important advantages over competitive

filter aids. Its lower wet density provides greater surface coverage per pound. This means substantial savings because six bags of Celite actually do the work of seven bags of other diatomites.

And Celite is uniform. Every pound of Celite comes from the world's largest and purest commercially available diatomite deposit. Every pound is processed and graded at the same plant under the same conditions. Yet, with the large inventory maintained at the plant and Johns-Manville's

nationwide network of warehouses, you're assured of fast, sure delivery.

So, if filtration belongs in your processing operations, it will pay you to call in your local J-M Celite engineer. Backed by Johns-Manville's research facilities and years of practical diatomite experience, he can help you with your filtration problems. Call him today or write Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario.

\*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

## Diatomite Filter Aids



Check 2538 opposite last page.

## CHEMICAL MATERIALS

reactions with Lewis bases.

**Description:** Diborane ( $B_2H_6$ ), available in commercial quantities, can be shipped as compressed gas, stored indefinitely at low temperatures, and handled safely with suitable precautions. It is a colorless gas at normal atmospheric conditions, and liquid between  $-165$  and  $-92.5^\circ C$ . Diborane decomposes slowly at room temperature to hydrogen and higher molecular weight boron hydrides.

(Diborane is available from Callery Chemical Co., 9600 Perry Hwy., Pittsburgh 37, Pennsylvania.)

Check 2539 opposite last page.

**Dichloroethyl formal is good paint remover, high-boiling solvent**

**Uses:** As a chemical intermediate and solvent.

**Features:** Material has excellent paint removing characteristics. It may be used as high-boiling solvent in printing ink and coatings.

**Description:** Dichloroethyl formal is 99 to 99.5% pure. It is completely soluble in hydrocarbons, linseed oil, low-mw polyvinyl chloride resins, rosin, ester gum, and practically all oils, fats, waxes, greases, and organic liquids. It is stable under anhydrous conditions, but hydrolyzes in aqueous acidic solutions to yield ethylene chlorohydrin and formaldehyde.

(Dichloroethyl formal is available from Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton, N.J.)

Check 2540 opposite last page.

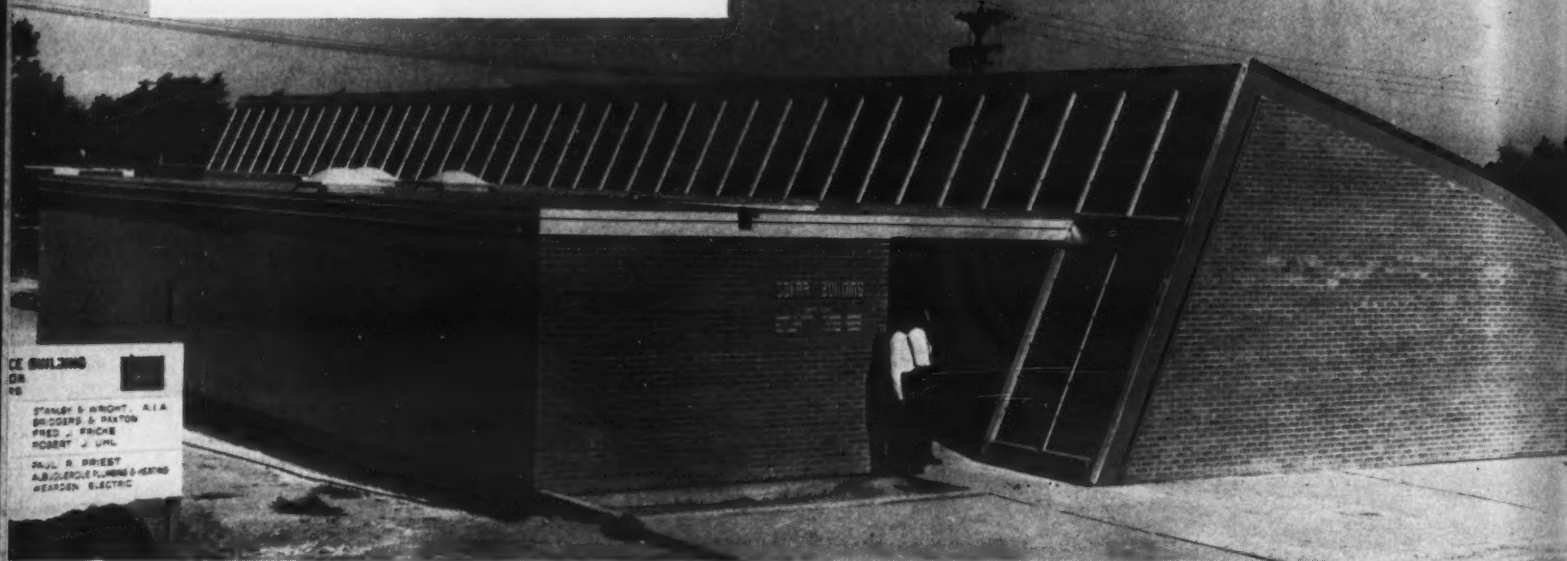
**Edible safflower oil**

Pocket-size four-page data sheet gives average characteristics, specs and applications of edible safflower oil, pharmaceutical grade. Edible safflower oil data sheet—Welch, Holme & Clark Co., Inc., One Hudson St., New York 13, New York.

Check 2541 opposite last page.



**IDEAS:** from other industries and nuclear field . . .  
new trends in research, processes, services



**DR. RICHARD C. JORDAN** is an outstanding authority in the fields of air conditioning and refrigeration. Since 1951, he has been Professor and Head, Department of Mechanical Engineering, University of Minnesota. Besides his collaboration on three books, Dr. Jordan has had over one hundred technical articles published.

As Chairman, Technical Advisory Committee on the Heat Pump for the American Society of Heating and Air Conditioning Engineers, from 1949 through 1951, Dr. Jordan was in close association with its development. Through his chairmanship of the Technical Advisory Committee on Solar Energy Utilization (1955-1958) and his participation in the World Symposium on Applied Solar Energy in 1955, he has maintained an active interest in, and close association with, this important energy source.

**Estimates of huge future world energy demands point up the need for conserving our customary energy sources. Space conditioning with solar energy plus the heat pump is coming in fast as one way of stretching these supplies. Every day, more efficient ways are being found for . . .**

## putting the sun to work

By **R. C. JORDAN**

Head Mechanical Engineering Department  
University of Minnesota  
From paper presented at  
recent American Power Conference

**T**he use of fluid fossil fuels in space heating, the virtual elimination of manual control, and the addition of effective heat distribution systems, have increased the ease and desirability of living in northern climates. Paralleling these trends, the rapid expansion of summer cooling has made more bearable the lower latitudes and the hot summer months of the temperature zones. Our burgeoning population will require an expansion of energy demands for both of these applications. Thirty percent of our entire

energy consumption in this country is now needed, and will probably continue to be allocated, for this purpose during the next century.

The foreseeable fantastic world energy demands (estimated by N. B. Guyol to reach 66 billion kwh by 1975, 184 billion by the year 2000) and the limited supply of stored energy sources, particularly the oil and gas fossil fuels, will probably make necessary the conversion of coal to fluid fuels within a decade or so. This may become the dominant

fuel in this country by the end of the century. The limited availability of oil and gas fuels will eventually make them more valuable as raw materials for the chemical industry. Uranium and thorium, with energy assets potentially totaling vastly more than all of our other combined energy resources, with the exception of solar energy, will almost certainly emerge at some time in the future as our dominant energy supply.

The eventual position of solar energy in competition with other



Solar heated office building has collector panels of ordinary window glass integrated into building design, tilted at an angle of 30°, and facing south

energy sources is more nebulous. But the potentialities are so vast that its ultimate utilization in large scale is assured. If estimates of future energy demands can be trusted, our eventual energy supply will be uranium and thorium breeder reactors and solar energy. Any applications which can be made of solar energy will result in conservation of our limited stored-energy fuels, including nuclear.

However, solar energy is the most difficult of our energy sources to adapt directly to useful purposes. One of the most probable near future uses in this country will be in space conditioning. The prime deterrents currently are the capital investment needed in equipment, and relative inefficiencies of thermal storage systems and solar collection devices.

Residential and commercial heat pump systems have emerged from the status of experimental curiosities to that of practical devices, as a result of the changing relative costs of fuels and the growing acceptance of comfort air conditioning. In early 1956 there were approximately 8000 residential and commercial heat pump systems in this country, with roughly 45 to 50 percent of these installed in the Gulf States area. Another 20 to 25 percent were north of the Gulf States and south of Chicago, and an additional 20 to 25 percent in the far western states. Air and water are the two primary heat sources for current heat pump systems. In both residential and commercial installations, the use of air as a heat source is now predominant. The anticipated mass adaptation of heat pump systems is partially restricted by the educational needs of those in contact with the buying public, and by utility acceptance.

Solar heating systems are further away from technical perfection and public acceptance. Such systems are currently hampered by the needs of large capital investments, the problems of the integration of the necessary solar collector designs into the build-

Table I. Summary of Design Conditions and Operating Costs for Heat Pump-Solar Heat Source System

City	Madison	Lincoln	Nashville	New Orleans
Calculated design heat loss, Btu per hr	65,000	62,000	53,000	35,000
Capacity heat pump evaporator, tons	4.2	4.0	3.4	2.3
Flat-plate solar collector area, sq ft	1210	715	1010	226
Emergency auxiliary heating system, Btu per hr	31,000	27,000	18,000	8200
Volumetric heat storage requirement, cu ft	600	460	470	156
Cost of fuel:				
Electricity, cents per kw-hr	1.5	1.6	0.4	2.0
Natural gas, cents per 1000 cu ft	90	50	75	55
Oils, cents per gal	14.2	11.5	13.8	12.0
Average winter heating costs in dollars:				
Gas	162	72	65	15
Oil	199	135	98	27
Heat pump	94	78	19	20

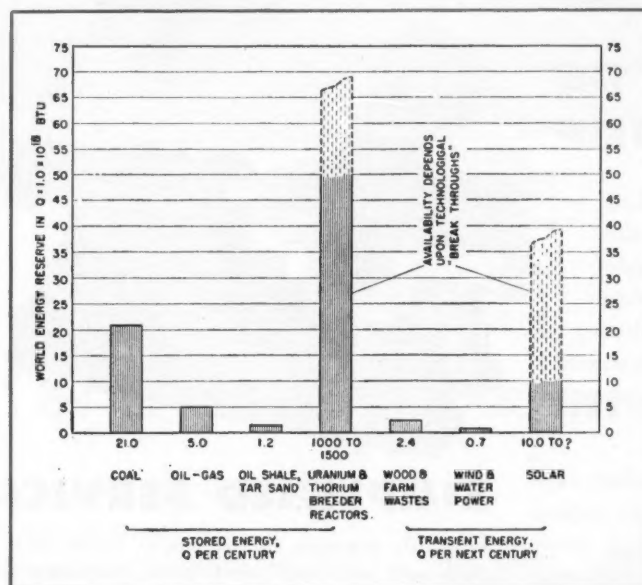


Fig. 1—World energy reserves available at no greater than twice current energy costs

ing architecture, and the relative abundance of fossil fuels which still exist on this continent. However, solar energy is capable of supplying all of the heating needs in mild climates possessing reasonable solar availability. For example, the solar heating system designed and constructed by Donovan and Bliss at Desert Grassland Station, south of Tucson, Arizona, has provided all space heating necessary during an average winter. The house has 670 sq ft

floor area, and the collector has 340 sq ft surface area. Operating costs during the first winter in 1955 were about one-sixth the equivalent cost of propane fuel.

One of the interesting near-future possibilities for the utilization of solar energy for space heating appears to be in the adaptation of solar energy as a heat pump-heat source, either partial or total.

Complete analyses of solar energy heat pump systems have been developed for the locations

of Madison, Wis.; Lincoln, Neb.; Nashville, Tenn.; and New Orleans, La. Several architectural designs were submitted, and one comprising a living room, garage, three bedrooms, dining room, kitchen, and bath was used.

A single-stage compressor system forming a year-around heat pump air conditioning system, with evaporator side heat storage, was assumed. A hypothetical storage medium with a heat of fusion of 10,000 Btu per cu ft and a melting temperature of 50°F was selected to fix storage volume and evaporator temperature conditions. Several chemical manufacturers have indicated the possibilities of synthesizing such a material, although it is not currently available. Weather Bureau records over a period of 20 years were analyzed to determine the heat storage periods required.

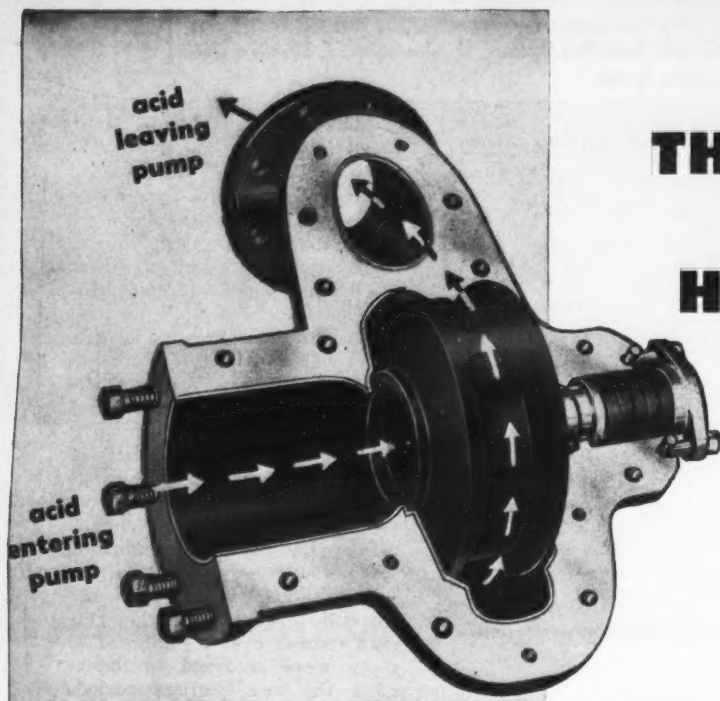
Table I presents a summary of the design conditions and operating costs for this hypothetical heat pump solar-source system. Amortization costs for the heating plants and the collectors were not included. Solar collector costs are changing so rapidly that any figures presented would likely be inaccurate. Although amortization costs are an important factor, perhaps even more important is the fact that the installation of the heat pump permits cooling in the summer months, and thereby provides total space conditioning despite the season.

#### Solar-heated Office Building

In the fall of 1956, the first completely solar heated office building was opened in Albuquerque, N. M. It has a gross area of 4300 sq ft and contains 830 sq ft of solar collector surface, providing a ratio of floor area to collector surface of slightly over 5 to 1.

The collectors, integrated into the design of the building, are tilted to an angle of 30° from the vertical, and face south. Flat-plate absorbing surfaces with integral aluminum tubes fabricated by the "roll-bond" process are used. Ordinary window glass is used for collector facing. Thermal storage is provided by means of a 6000-gal water tank installed

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## THE PUMP THAT BEATS THE HIGH COST OF CORROSION!

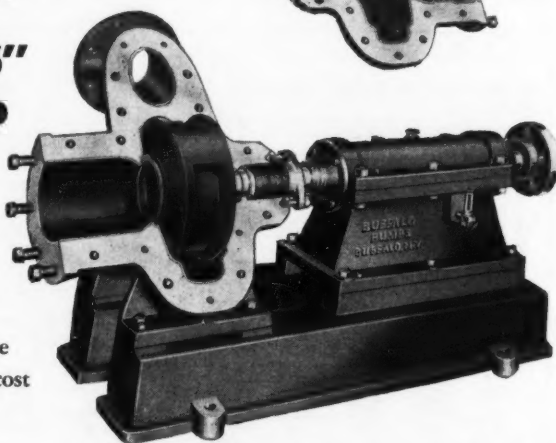
### "BUFFALO" TYPE "DS" RUBBER-LINED PUMP

If you pump corrosives or solutions containing abrasive solids, you'll save money with this "Buffalo" Pump. Rubber permanently bonded to the impeller and all liquid passages prevents the corrosion that could quickly put an ordinary metal pump out of action. Your savings in downtime and pump replacements quickly pay for the extra cost of the rubber lining.

And this "DS" pump design saves you in other ways, too. The efficient shrouded impeller does not depend on close running tolerances. It's non-clogging, which is why the "DS" is widely used in paper mill service, as well as in the chemical industries. It's just one of the broad line of "Buffalo" Centrifugal Pumps to move *your* liquids at the lowest possible cost over the longest possible period. Write for Bulletin 982 — *your* pump is in it!



A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID



### SIMPLIFIED SERVICING

Is readily apparent in this photo. Upper half of the diagonally split-shell pump casing is quickly removed without disturbing discharge piping — exposing impeller, stuffing box and passages for easy inspection and servicing. Upper main bearing half, too, is readily removable. Note rugged pump and bearing stands, ample stuffing box and bearing oil reservoir, all contributing to durability and reliability on the job.

### BUFFALO PUMPS

Division of Buffalo Forge Co.  
524 Broadway • Buffalo, N. Y.  
Canada Pumps, Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

Check 2542 opposite last page.

### IDEAS

#### Electricity from gases — dream now practical

Fuel cell produces power  
efficiently, economically

A laboratory curiosity for years, the direct conversion of chemical energy of gases into electricity has been accomplished with the development of a fuel cell capable of economically producing thousands of watts of power.

The new source of power uses hydrogen and oxygen as fuel. The first application of the cell is in providing silent electrical power for the US Army Signal Corp's "Silent



Mobile radar set operates on  
fuel cells which directly convert  
chemical energy of gases into  
electricity

Sentry"—the world's smallest known radar set. The lightweight, portable unit provides mobile army forces with local combat surveillance of enemy movements despite smoke, darkness, or fog.

Secret of the new fuel cell's success is the chemically treated, hollow, porous carbon electrodes through which the gases enter the cell. Electrodes conduct the electricity produced by the electrochemical reaction. The new fuel cell does not depend on high temperatures or pressure for efficient operation. It is designed to work at ambient temperatures, and at approximately atmospheric pressure.

Of simple construction, cell is merely a sealed jar into which hydrogen and oxygen are fed through special hollow electrodes. The electrochemical reaction of the gases at these electrodes produces an electric current, with only water as a by-product.

To page 99

CHEMICAL PROCESSING



## Watch out for the after-costs of Question Mark fittings!

Unknown fittings may look like a bargain on the price tag, but watch out for the consequences!

Surface defects led to the above "Question Mark" fitting being cut from the piping. Further examination showed the steel inside was laminated. Pieces cut out literally fell apart. Here was an open invitation to serious trouble . . . lost production, wasted dollars and possible human casualties.

This is another example of a dangerous situation posed by unknown fittings of questionable quality . . . a serious threat to the safety and economy of well-engineered piping.

**You can avoid these risks by specifying KNOWN fittings!**



**DANGER!** Your first warning of Question Mark fittings is their lack of complete, permanent identification of manufacturer, wall thickness, weight, material . . . as required by A.S.A. code.

*A message in the interests of top quality piping  
... by Tube Turns, Louisville, Kentucky*

**YOUR SAFEGUARD**

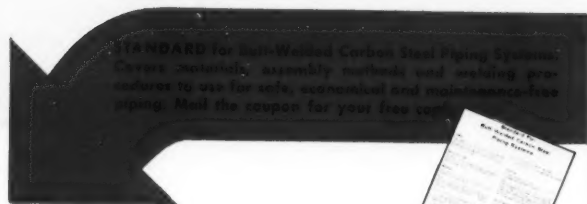




**Safeguard  
your piping  
investment with  
known fittings!**

The cost of fittings is a small fraction of the total cost of a piping system. To buy "cheap" fittings and run the risk of impairing the performance of your entire system can, therefore, be "penny wise and pound foolish."

When you specify and buy TUBE-TURN\* products, you know your investment is safeguarded by unsurpassed quality of fittings and flanges. They meet all American Standard and Safety Code requirements. Each product is permanently marked with complete size and material designation.



**TUBE TURNS, Dept. KK-9**

224 East Broadway, Louisville 1, Kentucky

Please send new Standard for Butt-Welded Carbon Steel Piping Systems.

Company Name \_\_\_\_\_

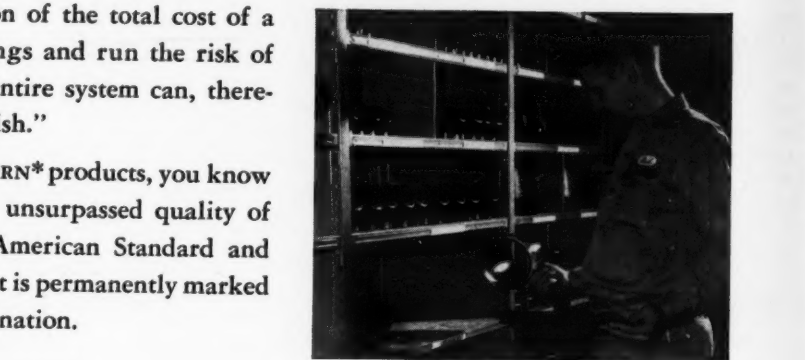
Company Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Your Name \_\_\_\_\_

Position \_\_\_\_\_

**TOP QUALITY!** Directional and size changes in this process piping are made with TUBE-TURN Welding Elbows and Reducers . . . recognized for their unsurpassed uniformity and quality.



**COMPLETE LINE!** Your nearby Tube Turns' Distributor gives you prompt delivery from the complete line of more than 12,000 Tube Turns' stocked items. Photo courtesy The Ross-Willoughby Co., Columbus, Ohio.

Available from your  
nearby  
**TUBE TURNS'**  
distributor



\*"TUBE-TURN" and "tt"  
Reg. U.S. Pat. Off.

**TUBE TURNS**

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

LOUISVILLE 1, KENTUCKY

**DISTRICT OFFICES:** New York • Philadelphia • Pittsburgh • Chicago • Detroit • Atlanta • New Orleans • Houston • Midland • Dallas • Tulsa • Kansas City • Denver • Los Angeles • San Francisco • Seattle  
**In Canada:** Tube Turns of Canada Ltd., Ridgetown, Ontario • Toronto, Ontario • Edmonton, Alberta • Montreal, Quebec

The water is disposed of by evaporation. Life of the fuel cell is theoretically unlimited.

The cells have operated eight hours a day, five days a week, for the past year, with no signs of deterioration.

As in most power plants, the fuel cell is not 100% efficient and some energy produced is wasted as heat. Normal operating temperature ranges from 120 to 140°F. Efficiency of operation ranges from 65 to 75% under these conditions.

Voltage across electrode of a fuel cell is approximately one volt. A number of cells can be connected in a circuit to get the voltage desired. Basically, the fuel cell is most desirable for high current, low voltage applications.

Although pure oxygen is required for higher current densities, cell can be operated with hydrogen and air, producing smaller amount of power. This is a particular advantage for small, mobile units which can be operated simply on a tank of hydrogen and surrounding air.

Future of the fuel cell as a producer of electrical energy depends on a practical, economical source of hydrogen, which at present is expensive and requires relatively bulky pressure vessels.

(Fuel cell was developed by National Carbon Company, Division of Union Carbide Corporation, 100 East 42nd Street, New York 17, N. Y.)

**Davy Jones' oil platform**

Illustrated brochure on pages describes basic requirements for proposed oil platform which will operate in waters up to 600 feet deep, six times deeper than possible. "Mobile and Platforms for Waters Up to 600 Feet" — R. G. Leaneau, Inc., 2399 South Arthur, Longview, Texas.

Check 2543 opposite last page.

For more information on product at left, specify 2543 on information request card opposite last page.

is disposed of by  
Life of the fuel  
retically unlimited.  
ls have operated  
a day, five days a  
the past year, with  
deterioration.

at power plants, the  
not 100% efficient,  
energy produced is  
heat. Normal oper-  
perature ranges from  
. Efficiency of op-  
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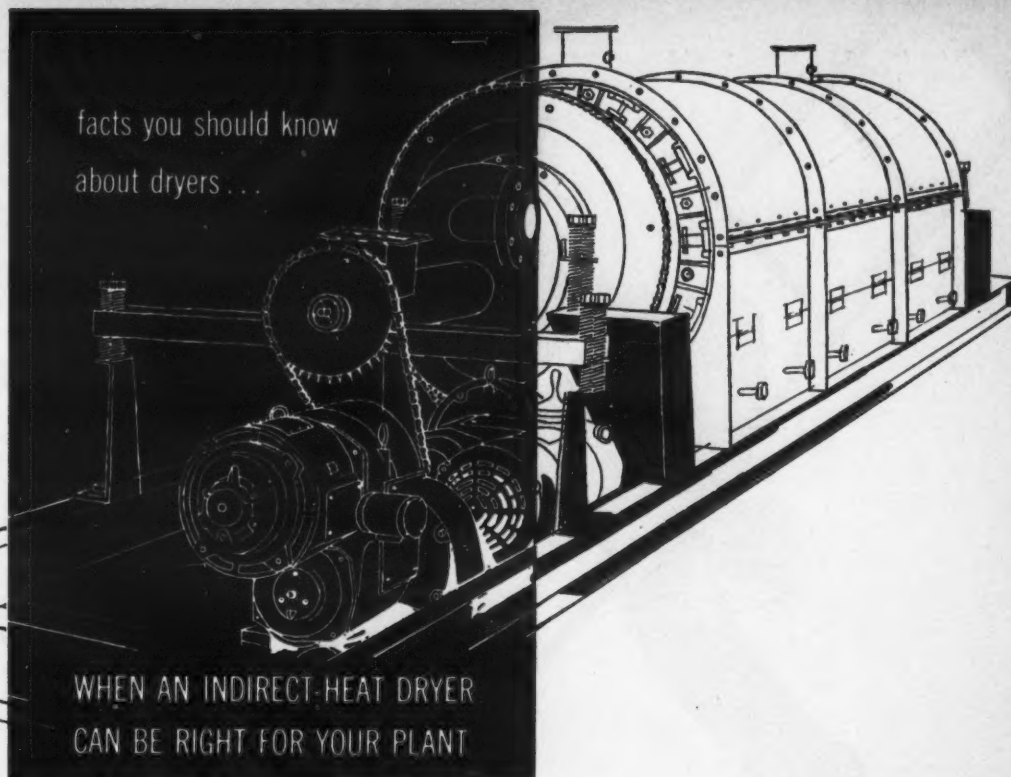
was developed by  
Carbon Company,  
f Union Carbide  
100 East 42nd St.,  
17, N. Y.)

#### 's oil platform

brochure of 16  
ibes basic require-  
proposed offshore  
which will operate  
up to 600 feet —  
deeper than now  
Mobile and Fixed  
or Waters Up to  
— R. G. LeTour-  
2399 South Mac-  
gview, Texas.

opposite last page.

information on prod-  
ft, specify 2544 . . .  
mation request blank  
last page.



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The records of this experience can often be applied to specific cases, possibly yours. For example . . .

**Q.** *My material is a filter cake, practically all minus 325 mesh, and must not contact furnace gases. It can be heated to 500° F. at least, without injury. What type of dryer would do the job best?*

**A.** You might consider using a direct-heat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heat-cost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the

dust problem and the heat cost.

**Q.** *What is meant by an indirect-heat rotary dryer?*

**A.** One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

**Q.** *How does an indirect-heat dryer minimize the dust problem?*

**A.** In an indirect-heat dryer, only enough air is admitted to carry off the evaporated moisture. Thus, the air has nothing to do with the heating

of the material. Generally, this low air velocity results in insignificant dust loss.

**Q.** *How does this differ from the operation of a direct-heat dryer?*

**A.** In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

**Q.** *It seems I need an indirect-heat dryer. How can I get competent advice and more information regarding my particular requirements?*

**A.** The Louisville Dryer engineering staff will be glad to analyze your requirements, arrange for necessary pilot plant tests, and submit an unbiased recommendation accompanied by estimated costs. You incur no obligation by using this service.



LOUISVILLE DRYING MACHINERY UNIT

**GENERAL AMERICAN TRANSPORTATION CORPORATION**

*Dryer General Sales Office: 139 So. Fourth Street, Louisville 2, Kentucky*

*Eastern Sales Office: 380 Madison Avenue, New York 17, New York*

*In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada*

*General Offices: 135 S. La Salle Street, Chicago 90, Illinois*

Check 2545 opposite last page.

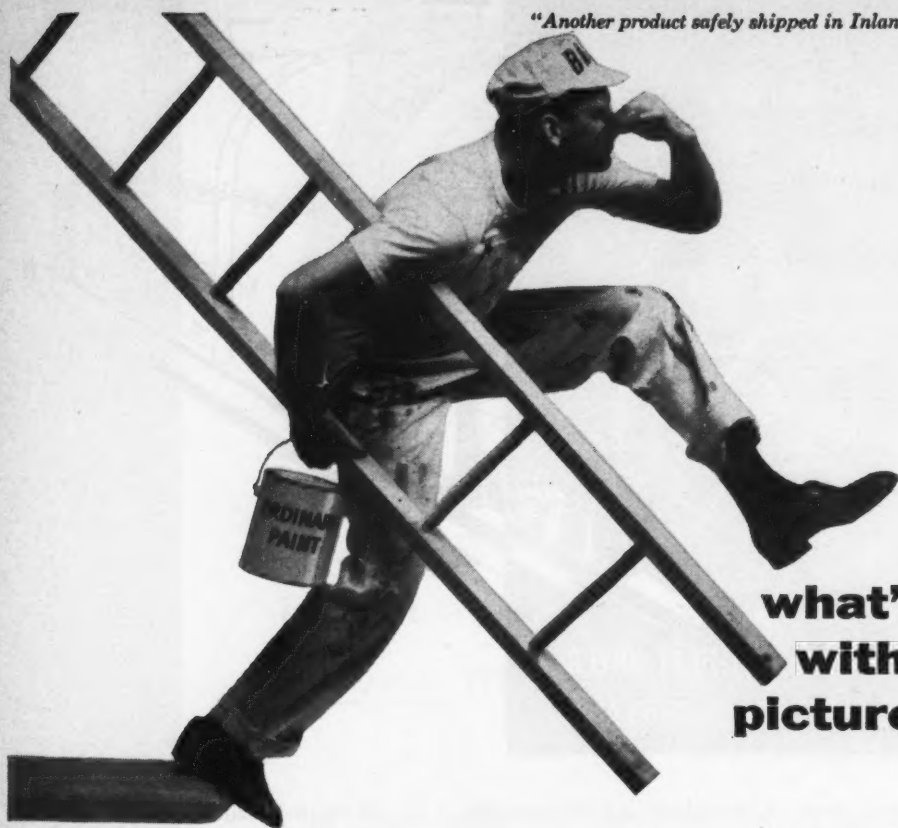
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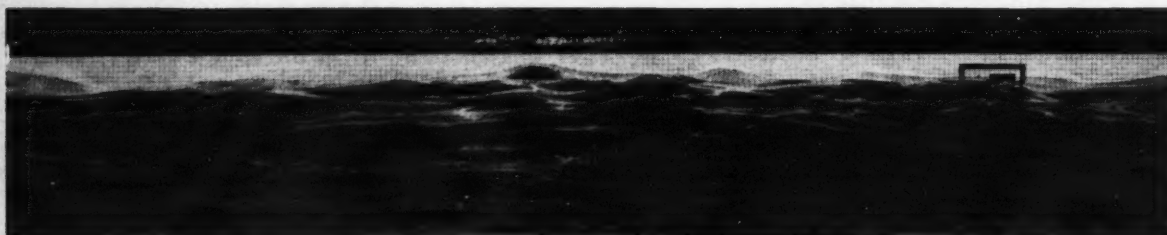
57

XUM

"Another product safely shipped in Inland 'protection-eered' containers"



**what's wrong  
with this  
picture?**



That's easy! Mr. Smith is about to paint a swimming pool with ordinary house paint! Those who know . . . use a special paint. A paint such as Ramuc Pool Enamel made by Inertol Co., Inc., Newark, New Jersey. Inertol knows, too, that it would be a commercial "faux pas" to rely on ordinary shipping containers to keep their special, protective paints free from discoloration and

contamination. That's why they use Inland "protection-eered" containers specially lined to maintain the purity of their products during transit, storage and use.

Do you have packaging problems? Why not let Inland's lining experts help you solve them. Write for complete details to Bob Boecher, Dept. 330C. *\*the right container, with the right lining for your product*

## INLAND STEEL CONTAINER COMPANY

Division of Inland Steel Company • 6532 South Menard Avenue • Chicago 38, Illinois • Plants: Chicago, Jersey City, New Orleans, Cleveland and Greenville, Ohio  
Full line of steel and stainless steel shipping containers, including galvanized and heavy duty ICC drums.



"It's Better to Ship in Steel"

Check 2546 opposite last page.

## IDEAS

### Key to water problem lies in economic considerations

Must be handled same as  
other scarce economic re-  
sources

Many statements have been made on the value of water and the serious consequences that will occur if we do not meet the "water problem." Already there are areas where economic development is being hindered or prevented because of inadequate or polluted water supplies. What can we do to control this situation?

The first thing that is needed is to bring about a sound financial understanding of the problem. This involves acceptance of the fact that water is an economic resource whose demand and supply can be analyzed in economic terms the same as other scarce resources.

### Control System Needed

The prime function of a private market economy and of the price system is to distribute the use of a resource where it is needed in order to do the most good. To do this, some kind of a control system is necessary.

For the most part, private market mechanism satisfies this requirement in regard to water resources. The mechanism has some limitations, however, which can be modified by State or Federal action. Such action would only supplement and not supercede the normal resource allocation process to assure equitability and the preservation of the public interest.

### Cost-benefit Analysis

In pursuing the economic analysis, the key question is: "What is the economic justification for State or Federal government supplementation of the market mechanism?" This takes us into the realm of cost-benefit analysis.

Cost-benefit analysis is designed to show whether the shift of resources from the

To page 103



## Would You?

Would you like to receive this magazine, **CHEMICAL PROCESSING**, regularly every month—without charge?

If you would and if you qualify, the publisher will add your name to the more than 50,000 key men in the chemical processing industries who receive each issue regularly.

Thus, the magazine will come to you personally each month to whatever address you designate and without charge.

The necessary qualifications are outlined on the request form that can be found opposite the inside back cover.

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If . . .

others in your plant would also like to receive **CHEMICAL PROCESSING** personally each month, they may be added to the form opposite the back cover.

Your application for subscription is welcomed.

For more information on product at right, specify 2547 see information request blank opposite last page.



# Slash those maintenance costs!



## try titanium now!

Mounting competitive pressure makes reduced maintenance costs essential. More and more companies are easing this pressure with titanium—now readily available. Only titanium combines unique corrosion resistance with high strength-weight-ratio and works equally as well in valves and pipes as in complex components.

But there are even more compelling reasons for trying titanium *now*. Its strength and lightness can affect the size,

performance and durability of equipment. It takes *continuous* temperatures up to 800 deg. F. and flash heats up to 2,000 deg. F., where other metals lose strength rapidly above 250 deg. F.

These or other characteristics of titanium could well be the answer to your most puzzling maintenance or production problem. Only by putting it to work on your process can you discover all the benefits that titanium can bring to you. Try it and see!

### GET UP-TO-DATE ON TITANIUM

Booklet gives cost saving service records. Tells where you can get titanium mill products and fabricated equipment now.



ELECTRO METALLURGICAL COMPANY  
Division of Union Carbide Corporation  
30 East 42nd Street, New York 17, N. Y.

CP-1

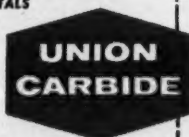
Please send me a copy of "New Heat on Titanium."

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

**Electromet**  
FERRO-ALLOYS AND METALS



The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

FOR CATALYTIC REFORMING

# 4 B&W Refractory Castables with low iron content

## B&W Kaocast

Ten years ago, B&W introduced this 3000° castable which offers a combination of high temperature use limit, as well as very low iron content. B&W Kaocast can either be gunned or cast in place.

## B&W Kaocrete-LI

After two years of extensive field service, B&W adds Kaocrete-LI to low iron content castables. B&W Kaocrete-LI, which has an iron content of less than 1%, has exceptionally high strength for resistance against abrasion and erosion. It has sufficient refractoriness for use at temperatures to 2700 F. Suitable for both gunning and casting.

## B&W Kaolite-LI

Another new castable with over two years of field service, B&W Kaolite-LI has high insulating properties due to its light weight (only 59 pounds per cubic foot). Its iron content is also less than 1%. It is designed to be applied with a cement gun only. Installation and maintenance time can be cut since Kaolite-LI does not require water curing and heat can be applied directly after gunning.

## B&W Kaocrete-32

Developed for special high temperature service, B&W Kaocrete-32 has extremely high strength and a use limit of 3200 F. It can be poured, plastered or gunned into place.

Properties of B&W Low Iron Content Castables

		B&W Kaocast	B&W Kaocrete LI	B&W Kaolite LI	B&W Kaocrete 32
Use limit, °F		3000	2700	2300	3200
Melting point, °F		3200	3100	2700	3297
Average density lb/cu ft after firing		126	131	59	134
Average % Fe <sub>2</sub> O <sub>3</sub>		1.0	0.9	0.8	1.0
Cold crushing strength— psi average— after heating for 5 hrs. at:	1000 F	700	2500	350	1000
	1500 F	500	2500	350	800
	2000 F	400	1200	300	750
	2200 F	500	1300	450	1000
	2400 F	500	1600	—	2000
	2600 F	1000	6000	—	3000
	2800 F	2200	—	—	3500
	3000 F	3500	—	—	4000
	3200 F	—	—	—	5000
Permanent linear shrinkage— average % less than— after heating for 5 hrs. at:	1000 F	0.3	0.2	0.3	0.2
	1500 F	0.3	0.2	0.4	0.2
	2000 F	0.5	0.2	0.4	0.2
	2200 F	0.5	0.2	0.6	0.4
	2400 F	0.5	+0.1	—	0.5
	2600 F	0.5	—	—	0.5
	2800 F	0.5	—	—	0.5
	3000 F	0.3	—	—	0.2
	3200 F	—	—	—	0.1

Consult your B&W Representative for additional information on these and other B&W Refractories for the refining industry.

B&W REFRACTORIES PRODUCTS: B&W Allmetal Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

**BABCOCK  
& WILCOX**

THE BABCOCK & WILCOX CO.  
REFRACTORIES DIVISION  
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.  
WORKS: AUGUSTA, GA.

THAT'S  
INTERESTING

## Midget aerosol

Two ounces replace 12 in midget insecticide aerosol. A little larger than a fat cigar, midget bomb is said to be equally effective as 12-oz bomb, and to last just as long because it is operated by a metered valve. Active ingredients, pyrethrins and piperonyl butoxide, are six times more concentrated than presently used insecticides and low in toxic hazards to humans.

## Metal support

Complex metal shapes may now be formed from metal fibers or filaments. Fibers are suspended in a slurry of glycerine and then fed into a felting tank where, with the use of suction, they form mat on moving belt. Sintered mats can be fabricated by one of several metal-forming processes. (*Glycerine Facts*, Glycerine Producers' Association)

For more information on product at left, specify 2548 see information request blank opposite last page.



From page

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Certain associated projects a calculate. more con of land, tion mat other su with a po ily, be d be quickl of dollar

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From page 100

private to the public sector is more advantageous than leaving them in the private sector.

Certain costs and benefits associated with government projects are relatively easy to calculate. Others are much more complicated. The costs of land, legal fees, construction materials, payroll, and other such costs connected with a power project can easily be determined. These can be quickly calculated in terms of dollars and cents.

#### How to Measure Intangibles?

However, what about pollution control where benefits are just as significant but do not readily lend themselves to computation in terms of dollars and cents?

We need to find a criteria by which such intangible benefits can be computed in economic cost-benefit terms as are tangible benefits.

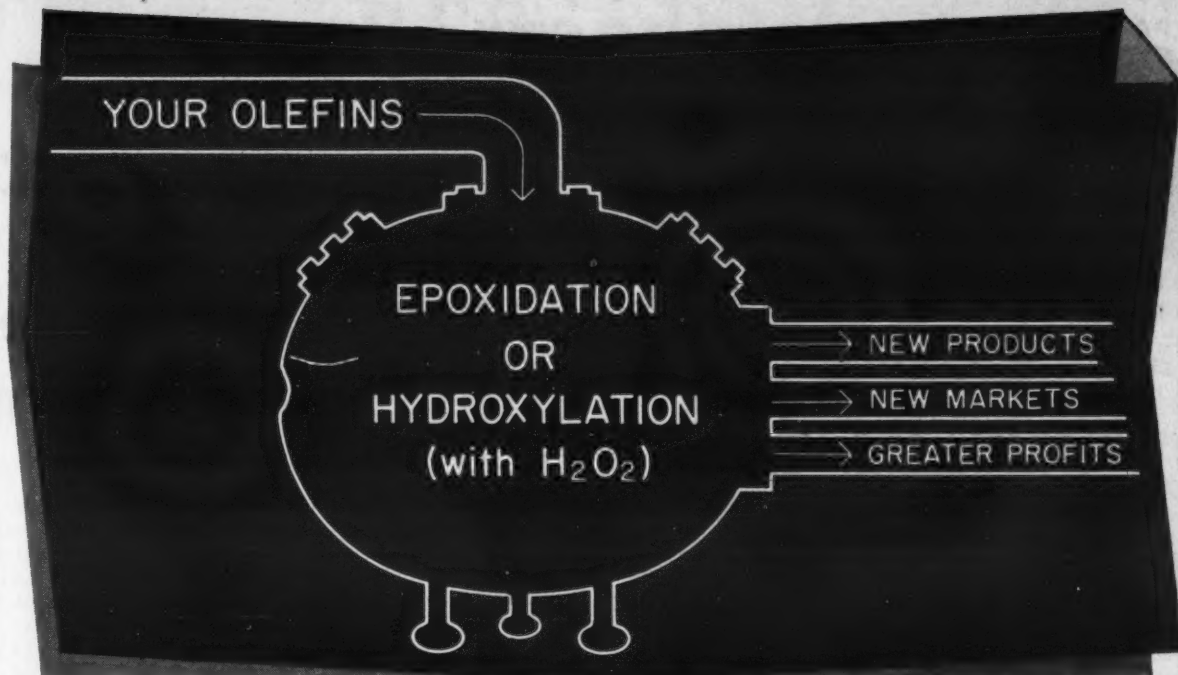
For instance, we need to determine what public health protection is worth. And, we need a dollar value for a day of fishing or an afternoon at the beach. To go still further, perhaps there may be a monetary value on the contribution of recreational water use to the reduction or prevention of juvenile delinquency.

#### Economic Analysis

The Public Health Service believes that it is time to study the application of economic principles to the management of our water resources.

We have initiated studies on the application of formal economic analysis to water pollution control and are beginning to look into economic concepts for the establishment of monetary values for intangible benefits.

(Based on paper presented at the Twelfth Industrial Waste Conference, Purdue University, by G. E. McCallum, Chief, Water Supply and Water Pollution Control Program, Public Health Service, US Dept. of Health, Education, & Welfare, Washington 25, D. C.)



## Blueprint for upgrading olefins with SOLVAY HYDROGEN PEROXIDE

Epoxidation or hydroxylation by means of SOLVAY Hydrogen Peroxide offers olefin processors a method of upgrading their products into higher profit items for new markets.

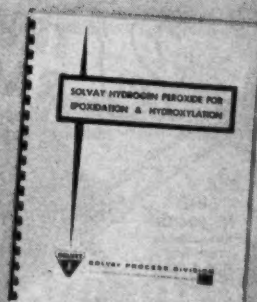
Typical higher profit products now being successfully produced by olefin epoxidation or hydroxylation are resin plasticizers, glycols, stabilizers, insecticides, polymers, lubricants, waxes, surfactants, brake fluids. Olefins commonly used in these processes include soya bean oil, cottonseed oil, tall oil, turpentine, linseed oil, unsaturated petroleum derivatives.



Aluminum Chloride • Chloroform • Soda Ash  
Vinyl Chloride • Calcium Chloride • Chlorine  
Potassium Carbonate • Sodium Nitrite • Cleaning  
Compounds • Caustic Potash • Snowflake® Crystals  
Sodium Bicarbonate • Caustic Soda • Methyl Chloride  
Ammonium Chloride • Methylene Chloride • Ammonium Bicarbonate  
Monochlorobenzene • Para-dichlorobenzene • Ortho-dichlorobenzene  
Carbon Tetrachloride • Hydrogen Peroxide

#### New Booklet Available

Write for this new review and bibliography on epoxidation and hydroxylation with SOLVAY Hydrogen Peroxide as a means of upgrading olefins. It contains facts, describes the methods, and lists many present and potential applications.



#### SOLVAY PROCESS DIVISION ALLIED CHEMICAL & DYE CORPORATION 61 Broadway, New York 6, N. Y.

- ☐ Please send me without obligation your booklet, "SOLVAY Hydrogen Peroxide for Epoxidation or Hydroxylation."  
☐ Have one of your representatives call to discuss it.

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Phone \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ BX-12

Check 2549 opposite last page.



# PALMER-SHILE

## Materials HANDLING EQUIPMENT

Engineered and Built  
to meet your needs

### CONTROLLED PRECISION DUMPING or POURING

**PS DRUM and BARREL TILT**



Especially ideal for handling chemicals, solvents, powders, etc. Unit for handling carboys also available. Equipped with two safety type locking devices and all steel, welded yoke. Turns 360° through worm drive. Hand-operated chain drive or 12" O.D. hand wheel.

Item B-731  
**\$248.35**

### LOADING and UNLOADING TRUCKS

**PS DRUM and BARREL SLING**



Handles drums, barrels, kegs that have a lip. Excellent for handling draining of drums. Heavy welded chain and forged grab hooks. Weight approx. 8 1/2 lbs.

Item B-205  
**\$22.50**

### CONVENIENT, SAFE HANDLING of LIQUIDS with

**PS Combination TRUCK and DRAIN RACK** loads automatically



Item NS 506 DH (detachable handles)  
**\$66.75**

Item NS 506 (handles welded to frame)  
**\$61.95**

DETACHABLE HANDLES

This dual purpose truck can be used to move barrels or drums and also serve as a drain rack. Available in two styles—handles welded to frame or with detachable handles that can be pulled out to conserve floor space. One set of handles can serve any number of trucks. Sturdy welded construction. Free-rolling 8" roller bearing wheels. Weight approximately 90 lbs.

DESIGNED AND MANUFACTURED BY

**Palmer Shile Co.**  
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# IDEAS

Lower fuel and maintenance costs plus virtual elimination of pellet breakage are advantages cited in new process for making . . .

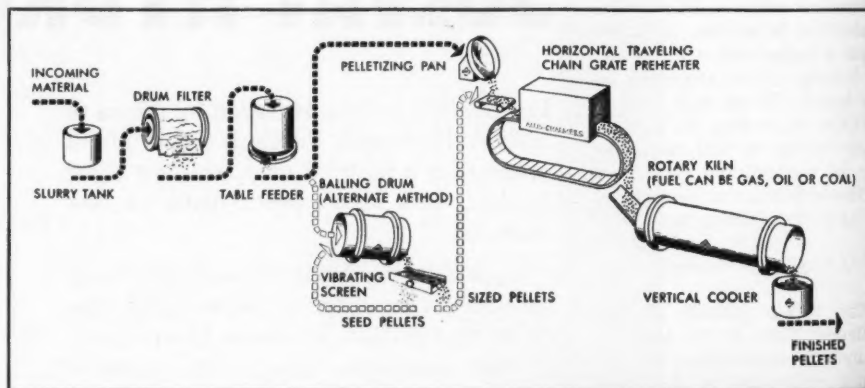
## tougher taconite pellets for blast furnaces

A new process for pelletizing and heat-treating concentrated magnetic taconite ore has been developed by Allis-Chalmers at their pilot plant in Carrollville, Wis. Pellets produced are extremely hard and durable — ideally suited for blast furnace feed. Process is expected to speed development of US taconite resources by offering steel and ore mining industries important new economies in fuel and maintenance costs, and virtual elimination of pellet breakage.

Significant difference between new process and a similar one publicized by

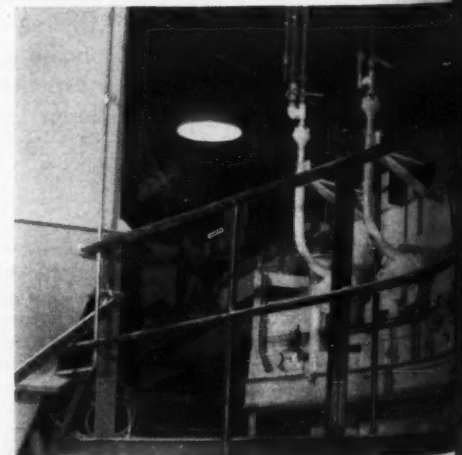
the firm in 1954 (see **CHEMICAL PROCESSING**, December 1954, pages 40-41) is that no coal is added to the pellets. All the heat necessary to develop the high pellet strength is supplied by a kiln burner.

Also, physical arrangement of equipment is such that it results in a more efficient and economical process. The rotary kiln and traveling-chain-grate preheater used in the new process are both enclosed, providing means of re-using exhaust gases. This arrangement keeps fuel consumption down to about 750,000 Btu per net ton. Enclosing the



Simplified flow diagram shows process for heat-treating pellets of magnetite concentrate. Incoming material at left has previously been crushed, ground, and magnetically separated to boost iron content from 20-40 percent up to about 65 percent

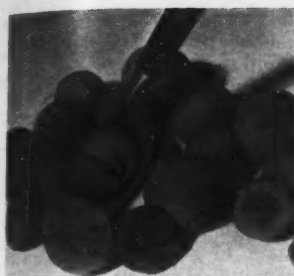
Pellets are dried and partially hardened in traveling-chain-grate preheater



CHEMICAL PROCESSING

Check 2550 opposite last page.

# B.F. Goodrich



Pellets are hard, durable — ideally suited for blast furnace feed

equipment also reduces dust and product losses, and the surrounding atmosphere is cleaner.

Essentially, the new process consists of four steps: 1) forming pellets in a balling pan or drum, 2) drying pellets on a moving grate, 3) heating (partially oxidizing) pellets on a moving grate, and 4) final burning of pellets in a short rotary kiln.

Process begins with the forming of  $\frac{1}{2}$ - to  $\frac{3}{4}$ -inch diam pellets from finely ground moist magnetite concentrates. Pellets are conveyed to a traveling grate, enclosed in a furnace which is divided into a drying chamber and a pre-heating chamber.

Pellets first enter drying chamber, where they are subjected to downdraft of hot gases which have been exhausted from preheat chamber at 600 to 800°F. After driving off moisture, these gases are exhausted to atmosphere at 250 to 350°F.

Grate continues moving pel-



## Koroseal plumbing for an acid bath

THAT tank contains corrosive sulfuric acid. It's used as a bath for cleaning wire and brass at Bristol Brass Corporation, Bristol, Connecticut. Other tanks contain bichromate and soap solutions.

A siphon method was formerly used to empty these tanks. Looking for a simpler, more efficient means of handling the job, Bristol engineers decided to install drainage pipe of Koroseal rigid polyvinyl chloride. Koroseal pipe was also installed to handle overflow.

Ask Bristol engineers about their experience with this Koroseal installation and they'll tell you how Koroseal PVC increased production, saved time and labor, cut maintenance problems, made possible a much cleaner operation, eliminated spillage and thus reduced acid consumption.

Koroseal PVC pipe is widely used in industry for carrying acids. Koroseal is equally inert to caustics, oils, greases, salts and most industrial chemicals. It lasts indefinitely without deterioration. Rodents will not harm it. Weather and sunlight will not affect it. Because it does not give off any odor or taste, Koroseal also is often used to carry water as well as chemicals.

Koroseal is very light—may be had in the form of pipe, pipe fittings, rods or sheet. It is readily threaded, drilled or sawed. It may be glued or welded together. In short, Koroseal is one of the most versatile, easy to handle materials used by industry today.

For further information on B. F. Goodrich rigid Koroseal PVC simply mail in the handy coupon.

### B.F. Goodrich

**INDUSTRIAL PRODUCTS CO.**

B. F. Goodrich Industrial Products Co.  
Dept. CP-12  
Marietta, Ohio

Please send me free booklets on:

- ☐ Rigid Koroseal Pipe  
☐ Rigid Koroseal Sheet

Name \_\_\_\_\_

Address \_\_\_\_\_

Company \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

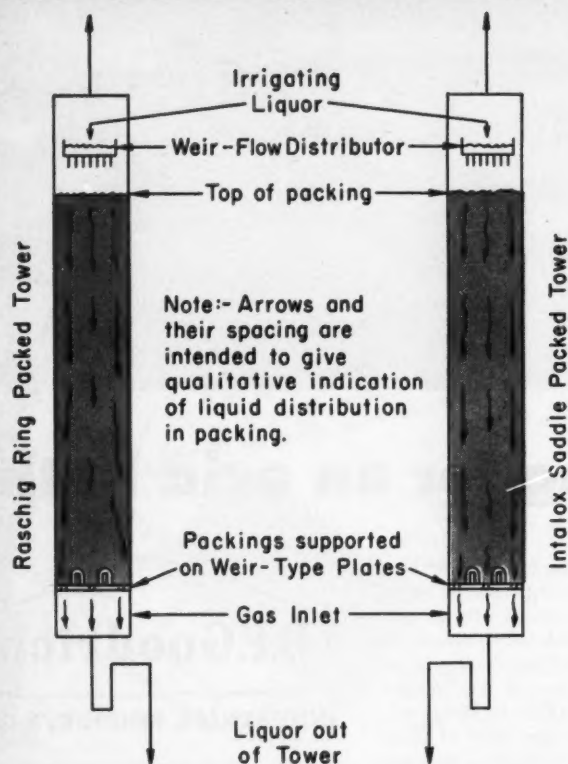
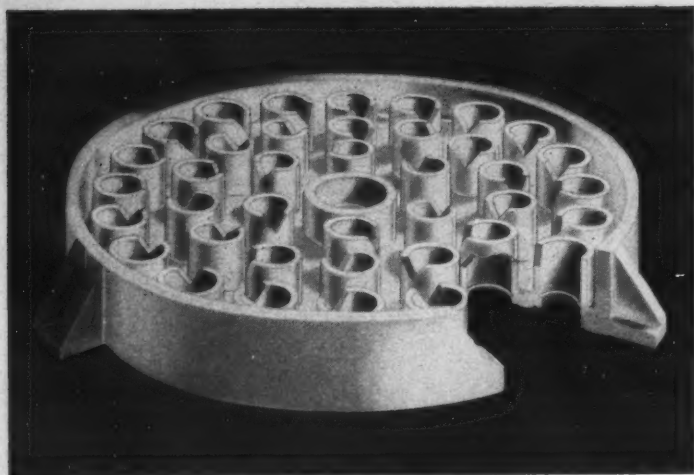
Koroseal—T. M. Reg. U. S. Pat. Off.

Check 2551 opposite last page.



# How to achieve better liquid distribution in

# PACKED COLUMNS



Full utilization of packing surface area in a column can only be realized if liquid distribution (both initially and throughout the bed) is such as to provide maximum wetted surface area.

The unique shape of the Intalox Saddle packing permits a thoroughly randomized arrangement of the packed bed, with a virtual absence of pattern packing. Thus, good initial distribution remains intact for greater packed heights than for columns of other packings, notably rings.

Now, U. S. Stoneware makes available two new types of tower distributors, each designed to take full advantage of the better internal distribution of Intalox Saddles. The "Multi-Level" is designed for low liquid rates; the "Weir-Flow" for medium-to-high liquid rates. Both distributors assure infinitely better initial liquid distribution than the conventional types of distributors heretofore available. While designed for use with Intalox Saddles, they will improve the distribution characteristics of any packed bed.

\* Made in chemical ceramics, carbon steel, or stainless.

131-F



## Full details in this NEW Bulletin

Bulletin TA-30 describes these new distributors. Gives data on packing support plates, how to install; when to re-distribute, and other data helpful to designers of packed columns. Free on request. Address Dept. CPI257, U. S. Stoneware, Akron 9, O.



Check 2552 opposite last page.

## IDEAS

lets to preheat chamber, where downdraft of 1750 to 1850°F highly oxidizing gases from the rotary kiln initiate conversion from magnetite to hematite. During oxidation, individual grains of transformed hematite bridge together by grain growth and recrystallization in a solid state to start formation of a mineral structure within the pellet. This reaction ( $4\text{Fe}_3\text{O}_4 + \text{O}_2 \rightarrow 6\text{Fe}_2\text{O}_3$ ) develops sufficient crushing strength (100 to 200 lb) to withstand the tumbling action of the kiln.

Heat-treating is completed in the rotary kiln, where high-temperature gases complete the development of the network of hematite crystals within each pellet. Temperatures in the kiln must range from about 2350 to not higher than 2450°F to assure development of optimum pellet strength.

Pellets are then cooled to recover sensible heat. Small amount of dust and fines which are airborne in kiln are carried along with hot kiln gas and filtered out as gas passes through bed of pellets on the grate. Product from this burning process is a superior pellet of hematite which, when subjected to established ASTM two-lifter-bar drum tumbling test, produces virtually no broken pellets and only from 1 to 5 percent fines (minus 28 mesh). Product is substantially harder than that obtained from other processes, according to Allis-Chalmers.

A number of methods for agglomerating and treating finely powdered taconite ore have been developed to date. Reserve Mining Company, for instance, uses the jointly developed Allis-Chalmers-Arthur G. McKee Company, pelletizing downdraft grate system at their Silver Bay, Minn., plant. Allis-Chalmers says, however, that all of the other methods involve one or more limitations in terms of high equipment, fuel, or maintenance costs, or excessive dust and pellet breakage.

(Additional information about taconite pelletizing process can be obtained from Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.)



### Radiation helps identify knock-causing deposits in gasoline

Information obtained during recent radiotracer tests permits evaluation of deposit-forming tendencies of gasoline, without engine testing. This was first use of radiation to study ways of making gasolines which do not leave knock-causing deposits.

In experiments conducted at Esso Research Center, Linden, N.J., researchers added minute quantities of radioactive compounds to ordinary gasoline and ran this mixture in special auto test-engine. By analyzing radioactivity of deposits formed in engine, harmful and harmless components of gasoline could be determined.

It was concluded that gasoline components with higher boiling points are most likely to cause deposits.

Certain high-boiling aromatics, were found to be worst offenders.

(Information courtesy of Esso Research and Engineering Company, 15 W. 51st St., New York 19, N.Y.)

### Patent improved process for texturizing yarns

Commercial process has been developed for bulking or texturizing yarns of all kinds. Method is reported to result in improved and increased bulkiness of the resulting yarn.

In the process, a multi-filament yarn is passed into a stream of air and the general direction of travel of the filaments is changed just as they enter the air stream.

Process is reported to have proved its value in a number of commercial applications now in use by several producers of bulk yarns. In view of growing popularity of the so-called bulked or textured yarns, process is expected to create considerable interest in the textile industry.

(Patent for process is issued to American Enka Corporation, Enka, North Carolina.)

# VOGT identification Disc...



...on top  
and  
in sight

makes it easy  
to identify valves  
— even in  
insulated lines

The Vagt tell-all identification disc, on every valve, is permanently located above the hand-wheel for complete and convenient identification. It shows valve size, catalog and drawing number, materials used for principal parts and primary pressure and temperature ratings. The flat on the handwheel protects the disc in assembly and in service.

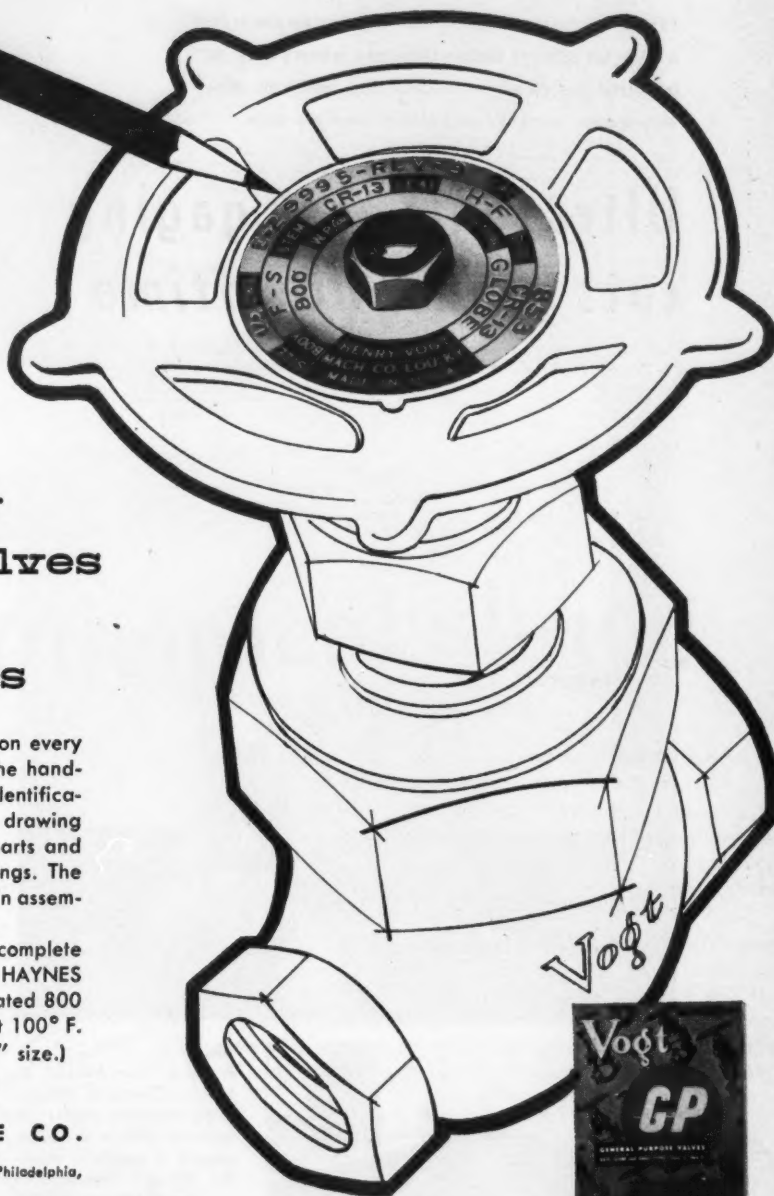
Vagt GP Valves are available in a complete range of sizes from 1/4" to 2", with HAYNES STELLITE\* faced seating surfaces and rated 800 pounds at 850° F. and 2000 pounds at 100° F. (Other types are available through 8" size.)

\*Trade-Mark of Union Carbide and Carbon Corporation

HENRY VOGT MACHINE CO.

P. O. BOX 1918, LOUISVILLE 1, KY.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Philadelphia, St. Louis, Charleston, W. Va.



# Vogt



DROP FORGED STEEL

## VALVES

Adv. No. 7 in a series describing the features of Vagt GP Valves.

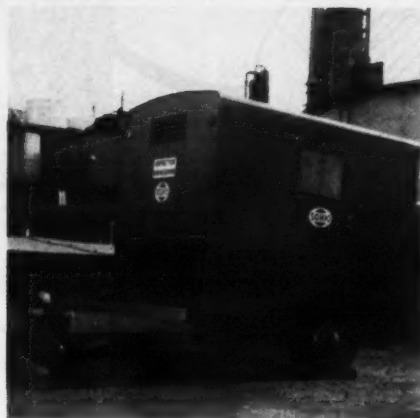
Write for Your FREE COPY of Supplement No. 1 to Catalog F-9. Address Dept. 24A-FCP.

Check 2552A opposite last page.



Subject to constant abrasion and high temperatures, cat cracker lift pipes at Sohio's Cleveland refinery must be inspected periodically — to determine minimum section thicknesses. Conventional methods were too slow.

## Ultrasonic test gaging cuts plant 'downtime'



Engineer Roy Atwood at Sohio's Cleveland refinery using ultrasonic tester on spheroid shell. In the background is catalytic cracking unit. Lift pipe runs to top of this cracker

This trailer was designed by Sohio inspection engineers for convenient inspection trips around No. 1 Refinery in Cleveland



WILLIAM C. CLARKE, Assistant Editor  
With ROBERT BUHROW, Inspection Engineer  
And WALTER BRAUCKMANN, Inspection Engineer  
Engineering Department, No. 1 Refinery  
Standard Oil Company (Ohio)

**Problem:** Two lift pipes, used to blow catalyst beads to the top of twin Thermoform Catalytic Cracking units, must be inspected annually for thickness and wear. Taking measurements as he goes, an inspection engineer at Sohio's No. 1 Refinery in Cleveland is lowered from the top of a 230 foot lift pipe to the ground, making a minute inspection of the interior wall surface.

Another ultrasonic thickness testing method had been used, but speed of inspection was too slow and coverage poor. When inspection of the cat cracker unit is scheduled, lift pipe inspection comes first and has to be completed before any other mechanical work can start. Old testing method consumed six precious hours.

Extreme dust was part of the problem. Convection currents of air set up in pipe over the 230-foot length caused inspecting engineer to experience extreme discomfort during winter months. Although a six hour job, the most a man could stand was approximately two hours.

Also, test results were not immediately available outside the pipe. The inspection engineer called out his results to a record-

ing group outside at the top of the unit.

Not only did the test and gaging methods result in extreme discomfort for the man doing the work, the program of testing and gaging was slow and coverage — it is felt — was inadequate.

**Solution:** A recently developed ultrasonic tester was obtained on a rental basis in February, 1956. Full series of tests were made, comparing the unit against previously used ultrasonic thickness measuring instruments. Subsequently the new instrument was purchased because of its greater accuracy, better job coverage and reduction of job time to just two hours.

The instrument permits measurements to be made within 1/10 of one percent of the actual thickness. Standard scales are accurate within  $\pm 0.0005$  to  $\pm 0.003$ " depending on thickness range covered.

With two components, the instrument requires two men for operation. Man on the "front" end carried the oscillator and piezoelectric transducer to be applied to material under test. When the transducer is placed in contact with a material, with a thin liquid film as a coupler,

# See "It" unveiled

Engineer Joel Kunesh makes thickness reading on TCC lift pipe. Indications are read from bright vertical lines on large interchangeable scales on face of television-like console

resonance indications are obtained, producing a readable signal on face of the cathode-ray tube of the other component. A cable 100-400 feet in length connects the two, although up to 1000 feet can be used.

## How Does it Work?

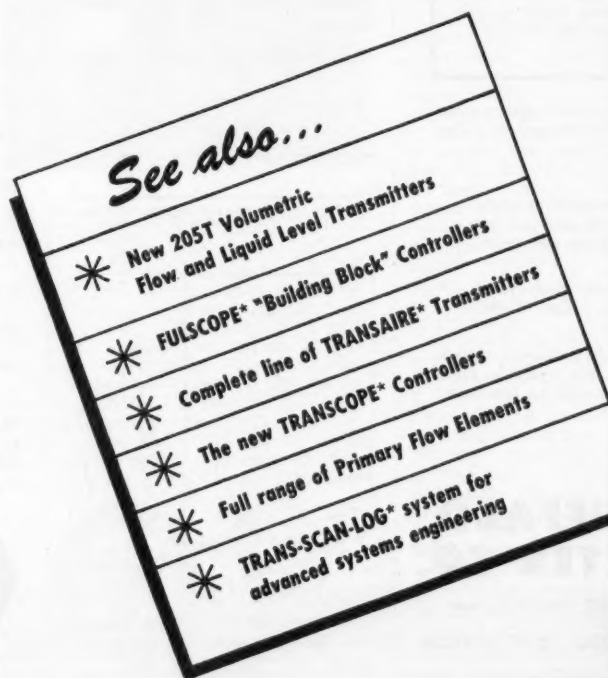
Each thickness of the material has its own natural resonant frequency. When ultrasonic waves which equal the resonant frequency of the material are applied to it, a considerable increase in the amplitude of vibrations in the material occurs. Indications of this resonance condition are obtained at the fundamental frequency and at harmonics (multiples). Direct-reading scales for harmonics allow operator to measure material sections instantly, without calculations.

Deciding to adapt the instrument to conditions of mobile use at the refinery, inspection engineers designed and built a truck-drawn trailer to carry all components of the instrument and to protect the operator from weather. The use of the trailer has worked out very well, not only for the thickness testing instrument but as a storage point for all inspection tools and as a base of operations during field inspections. Additionally, engineers are using regular-powered telephone operator head-sets for communication between the gage operator and the test location. Conductors and connectors are contained within extension cables.

**Results:** With thickness readings directly and instantaneously available, Sohio has found a great deal of time is saved in making a reading or in learning that a reading is impossible to obtain. Additional advantage is instru-



## at the Chemical show!



"PROBABLY the most significant advance in instrumentation in the last ten years..."

That's what one conservative chemical engineer said about what we've hidden under black velvet in the picture above. He made other laudatory comments, too, but they were technical ones—and to quote them would spoil the mystery.

Taylor engineers designed this instrument with *your* processing problems in mind. Bring your problems to Booth 104 at the Chemical Show... see this ingenious new Taylor Instrument. It will be no mystery how it can go to work for you. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

\*Trade Mark

**Taylor Instruments**

— MEAN —

**ACCURACY FIRST**

VISION • INGENUITY • DEPENDABILITY

Check 2553 opposite last page.



# For the difficult Liquid Metering Problems Use Niagara Meters



Close-up of Niagara Molten sulphur Meter shows steam connections from pipe jacket to meter jacket. Note extension which keeps meter register case away from heat.

● Niagara displacement type liquid meters have a surprising range of applications. Their ultra-simple design, and variations of materials enable them to operate under most difficult conditions.

#### For example:

In the production of sulphuric acid it is desirable to measure the amount of sulphur fed to the burners so that the efficiency of the process can be checked. A Niagara Meter with a steam-jacketed cast iron casing and stainless steel working parts was selected for the job.

Since April of 1955 more than two million gallons of lime neutralized and filtered, dark Louisiana sulphur have been metered at a rate of 560 G.P.H. . . . without a shutdown for repairs or maintenance.

There is a dependable Niagara Meter to meter almost every liquid including caustic soda, sulphuric acid, soap, petroleum products, fruit juices, calcium chloride, alum and many others. The Niagara water meter line is standard for cold or hot water measurement.

Please send me information on Niagara Chemical Meters.

Liquid.....  
Flow g.p.m.....Temp.....  
Name.....  
Company.....  
Address.....

**BUFFALO  
METER CO.**

2892 Main Street  
BUFFALO 14, NEW YORK

Check 2554 opposite last page.

## INSTRUMENTATION

ment's ability to scan a surface. Inspection engineers are able to quickly search out an area for a minimum reading or can check the surface around the circumference for unequal wall thickness very easily.

Inspection engineers at Sohio have found the ultrasonic test gage to be easy to use. Training of operators is relatively simple.

Test plugs, drilling, and other methods are no longer standard procedures for determining thicknesses throughout the refinery. Large numbers of readings can now be taken for statistical analysis purposes on every square foot of selected areas of vessels, with use of this instrument. Inspectors are confident that they are solving the problem of determining when equipment needs to be repaired and what needs replacement. By knowing in advance, inspection engineers are able to recommend proper maintenance which can be, depending on circumstances, building-up with metal, alloy lining, or simple replacement.

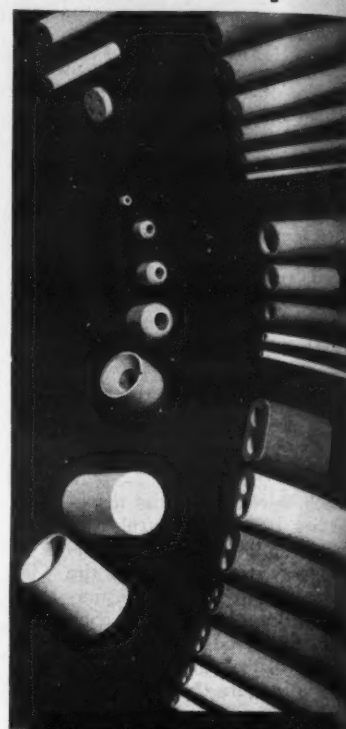
("Vidigage" ultrasonic thickness gage is product of Branson Instruments, Inc., 37 Brown House Rd., Stamford, Conn.)

Check 2555 opposite last page.



Our thanks for this cartoon goes to Tom Blakley, Florida East Coast Fertilizer Co., Homestead, Fla.

## Insulators for Thermocouples



thermal shock resistant?  
mechanical strength?  
high temperature resistant?

**It's SERV-RITE<sup>®</sup>  
for any need**

One or more of these SERV-RITE thermocouple insulators will take care of your needs. If not, there are many more in Gordon's large stock for quick delivery. If you need something entirely special, it can be made to suit your specific requirements.

In the 50 years that Gordon has been supplying thermocouples and accessories to industry, emphasis has been on uniform top quality, service, and value. And so with insulators for any thermocouple application, SERV-RITE assures you of plus values every time.

Write for full information on SERV-RITE thermocouple insulators.

#### Ask for Bulletin 300-56

This new 4-page bulletin gives specifications and ordering data on all Gordon standard SERV-RITE thermocouple insulators grouped for easy selection.

**CLAUD S. GORDON CO.**

Manufacturers • Engineers • Distributors

603 West 30th St., Chicago 16, Ill.  
2031 Hamilton Ave., Cleveland 14, Ohio

Check 2556 opposite last page.

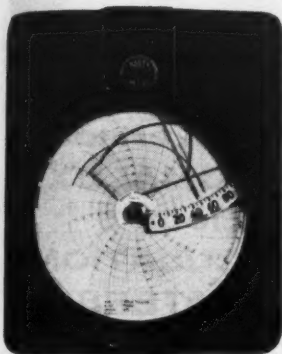
CHEMICAL PROCESSING

**Combines programming, receiving, recording in one case**

Easily-added component extends functions

**Uses:** Programming and controlling process variables in operation of batch cooking processes, control drying, other applications where process variables must be controlled according to a fixed time schedule.

**Features:** Programming component is plug-in unit for manufacturer's recorder. With this additional component, programming, receiving, recording can be in one case.



Program controller, a "plug-in" unit, can be added to recorder for simplified control

**Description:** Set-point signal for controlling process variables is produced in accordance with shape of 6-inch-diameter aluminum cam. During programming cycle, one or two snap-action switches for external functions may be operated at specified points.

Program controller may be set to repeat full cycles continuously, stop automatically at end of each cycle, or omit or repeat any portion of cycle.

Independent motor with separate "on-off" switch drives program cam at standard speed of 1, 4, 6, 8, 12, or 24 rpm. Unit operates on 115 volts AC.

(Program controller is product of Bailey Meter Company, 1050 Ivanhoe Rd., Cleveland 10, Ohio.)

Check 2557 opposite last page.

# Emery

## WEIGHING SYSTEM

BIN, TANK AND HOPPER EDITION

No. 7

Covering design, development and application data on Emery Weighing Systems for industrial applications

## ENGINEERS AT PARKE, DAVIS & CO. ADOPT NEW CONCEPT OF TANK WEIGHING IN BROMINE PROCESSING PLANT

### SPECIAL CONDITIONS IN BROMINE STORAGE AND WEIGHING AREA PROMPTED SELECTION OF EMERY LOAD CELLS.

In selecting weighing apparatus for a bromine storage and process system at its Holland, Michigan, plant, Parke, Davis & Company engineers were faced with an interesting set of factors which led to the eventual choice of a relatively new concept in process control . . . tank weighing instead of measuring tank contents. Emery Hydraulic Load Cells were selected to handle the weighing job.

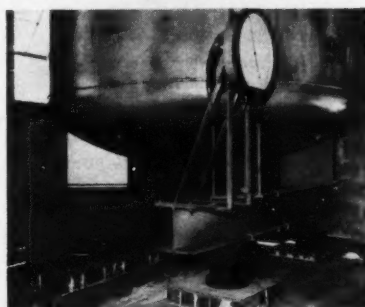


Fig. 1. Close-up view of the bromine storage tank showing how Emery Load Cells support the front end while the back end is carried on a 21" I-Beam.

The process required weighing of bromine in both storage and in process. Liquid bromine is pumped from the storage tank to an elevated intermediate tank where the required amount for use in the process is weighed. Excess bromine in the weigh tank is drained back to the storage tank. The system is vented through a fume scrubber.

The corrosiveness of bromine liquid and vapor dictated that an external gauging system be used. The lead lining of

the storage tank precluded the use of gauging systems using radioactive sources. Compressed air of the necessary pressure was not available for weighing equipment using air as a motive force. The possible damage to beam scales by the corrosive action of chemicals and fumes was a deterrent to the use of this equipment. Equipment utilizing an electrical signal would have to be explosion-proof or remotely located from the hazardous area. Thus, Emery Hydraulic Load Cells were selected.

Two EC-30 Emery Cells support the storage tank in front; the back end being carried on a 21" I-Beam. The Emery 16" Indicator is set directly in front of the tank.

The weigh tank is suspended on a sling and linked to an overhead support through another EC-30 Emery Load Cell. A 21" dial indicator is located at floor level at which point the pump control is operated to fill the weigh tank with the required amount of liquid bromine which is then forwarded to the point of processing.

In specifying Emery Load Cells in this bromine weighing application, Parke, Davis & Company found that the peculiar conditions surrounding this particular installation were easily met by an Emery tank weighing system.



Fig. 2. Emery Dial Indicator for weigh tank is conveniently located above pump control. Operator can fill weigh tank to exact weight, then shut pump off.

If you face conditions of a similar nature . . . or if you have a tank weighing problem of any kind, our engineers will gladly study it and make recommendations. Be sure to send for our Bulletins 561 and 571.

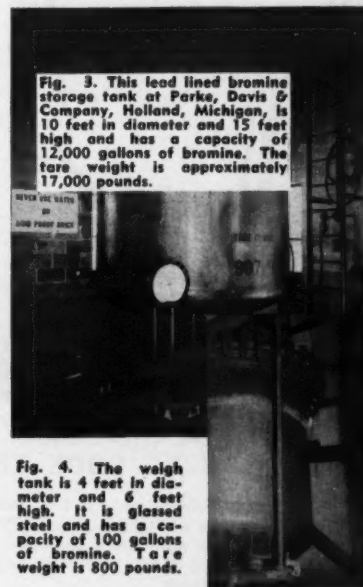


Fig. 3. This lead lined bromine storage tank at Parke, Davis & Company, Holland, Michigan, is 10 feet in diameter and 15 feet high and has a capacity of 12,000 gallons of bromine. The tare weight is approximately 17,000 pounds.

Fig. 4. The weigh tank is 4 feet in diameter and 6 feet high. It is glassed steel and has a capacity of 100 gallons of bromine. Tare weight is 800 pounds.

### Tank Weighing Data

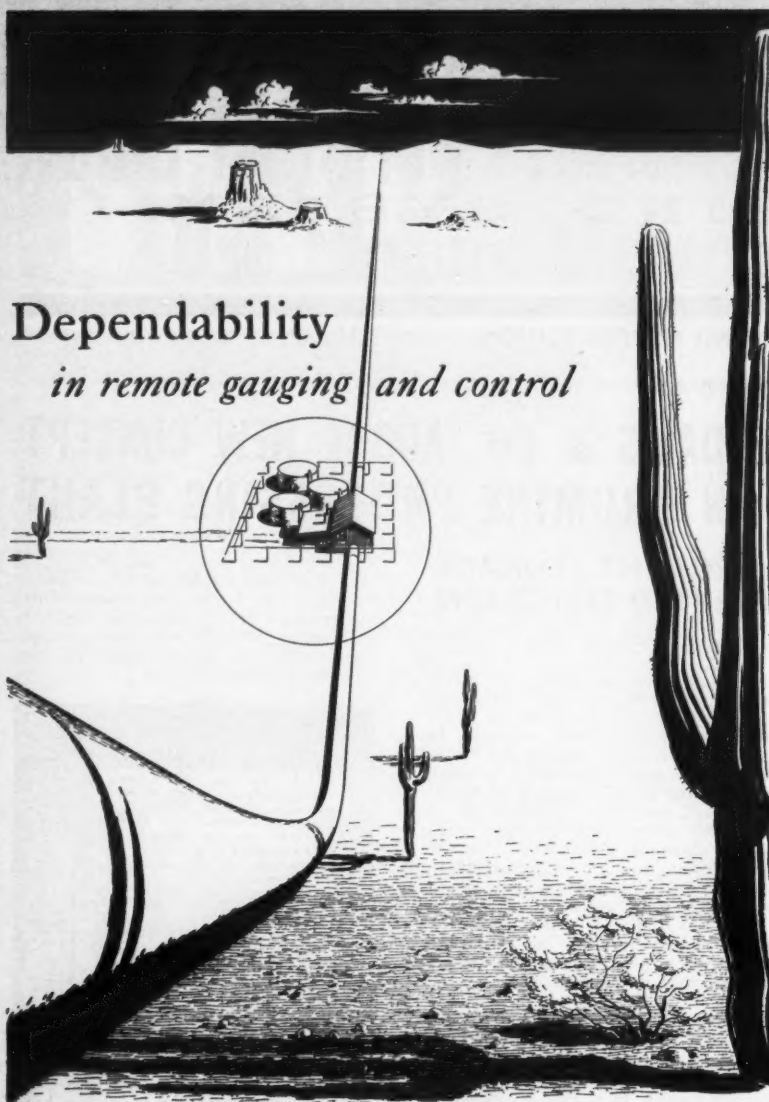
Our Bulletins 561 and 571 are filled with technical data on tank, bin and hopper weighing; the arrangement of cells and instrumentation; and the new approach to tank weighing through the results you need. If you have not received your copies send for them today.



THE A. H. EMERY COMPANY  
Pine Street • New Canaan, Conn.

Check 2558 opposite last page.





## Dependability in remote gauging and control

### **"Varec" PULSE CODE TELEMETERING**

ISOLATED LOCATIONS, such as this lonely pumping station, provide the acid test for remote control gauging and operating equipment. Prolonged exposure to the ravaging effects of sun, wind, sand and rapid temperature changes demands the absolute best in the design and manufacture of all equipment. There is never room for costly compromise.

"Varec"-equipped pipelines and refineries all over the world, operating automatically and efficiently, have proved the economic practicability of remote controlled gauging and operation. There are "Varec" models for automatic scanning and data printing, manual scanning, temperature reading and recording, automatic or manual actuation of valves, pumps and other field equipment, and automatically-controlled tank switching. "Varec" PULSE CODE always reads safe—if a pulse is lost or gained you get no reading, not an incorrect reading.

There are "Varec" models to perform many necessary functions involved with the operation of flow tanks, pumping stations, tank farms, and refineries automatically, economically, and dependably. For amazingly fast pay-out, automate with "Varec"—the pioneer and leader for over 30 years.

Write for Bulletin CP-3012 for full details on "Varec" PULSE CODE Telemetering.



The VAPOR RECOVERY SYSTEMS COMPANY  
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961-24

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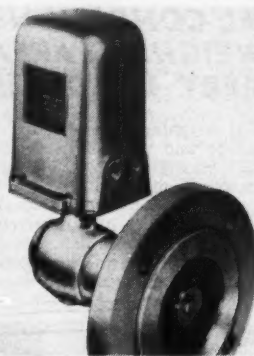
## INSTRUMENTATION

**Viscous fluids, slurries  
are no problem to this  
liquid level measurer**

**Uses:** Measuring level of viscous liquids or slurries in open or closed vessels.

**Features:** Differential pressure liquid level transmitter operates on force balance principle and maintains calibrated accuracy over wide range of ambient conditions. Purging is not necessary, since liquid is not conducted through tubing to instrument.

**Description:** Level measuring element, silicone-filled



Transmitter accurately measures level of viscous liquids in open or closed tanks

diaphragm capsule, is assembled in a 3-inch flange for flush mounting on side of vessel. Head of liquid applies force to high pressure side of capsule which is opposed by force on low pressure side.

Low pressure side may be open to atmosphere for measurement of open tank level. It may be connected by piping to top of closed tank to balance-out static pressure.

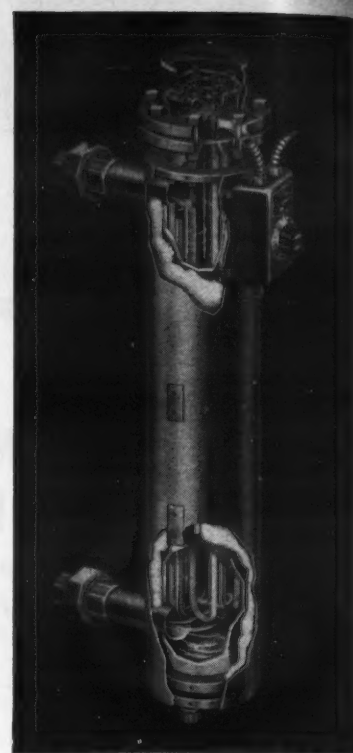
Adjustable range suppression and elevation springs can be attached for various installation arrangements.

The 3-15 psi pneumatic output of transmitter will operate remote indicator, recorder or controller. No auxiliary amplifier is needed.

Wetted parts are 316 Stainless Steel.

(Type 13FA d/p cell transmitter is manufactured by The Foxboro Co., Dept. CP, Foxboro, Massachusetts.)

Check 2560 opposite last page.



## Convert to **CHROMALOX®** Electric **CIRCULATION HEATERS**

with new higher ratings

- fast • automatic
- economical

For controlled heating of water, oil, heat transfer media, steam, air and other gases.

Low cost installation and maintenance.

Automatic thermostatic control—set it and forget it...

No flames, flues, fumes. No smoke. No soot.

Compact, completely packaged. Built-in heating elements, heating chamber, thermostat and insulation. All you need do is connect 2 pipes, 2 wires.

### Free Bulletin

Get the full story. Call your Chromalox Representative or write us direct for Bulletin 701.



**Edwin L. Wiegand Company**

7517 Thomas Boulevard • Pittsburgh 8, Pa.

C-3118-A



Check 2561 opposite last page.

CHEMICAL PROCESSING



THAT'S  
INTERESTING

#### Cell studies

A method for recovery of large pieces of cell walls and compounds inside cells has been developed at the University of California. Cells are suspended in a concentration of glycerol above 0.5 M. When concentration is suddenly diluted with water, hydrostatic pressure ruptures cell wall and provides selective method of extracting cytoplasmic substances. (Glycerine Facts, Glycerine Producers' Association)

#### Dial durability

Greater corrosion-, abrasion-, and moisture-resistance has been given to instrument dials by United States Radium Corp. Life expectancy under extreme conditions has been extended by as much as 100%. Dials remain easy-to-read longer, reducing error possibility. Key is high-temperature fusing of coatings.

For more information on product at right, specify 2562 see information request blank opposite last page.



## Newly designed Type H Motor Control

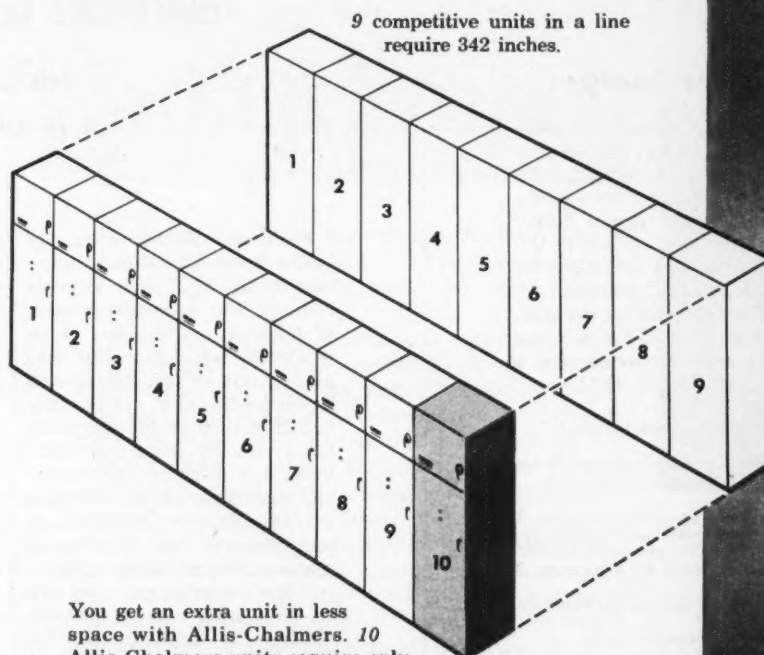


## Saves valuable plant space

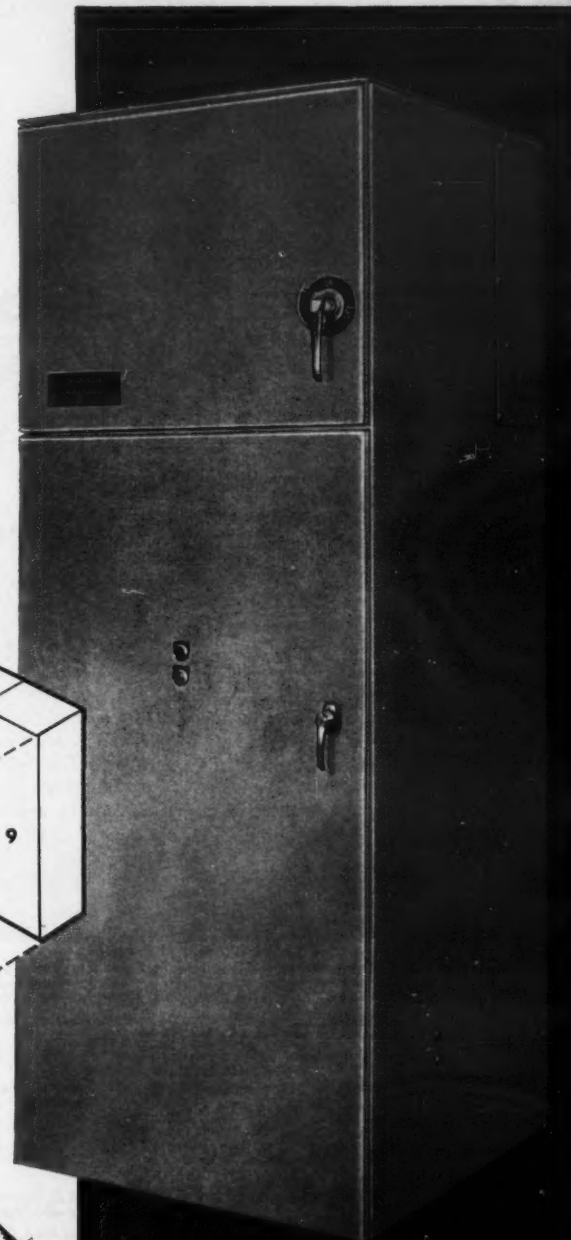
Newly designed Allis-Chalmers high voltage control units are only 34 inches wide. This means you can put 10 Allis-Chalmers cabinets in less space than required by 9 competitive 38-inch units. In addition, the narrower width means less space required for door swing. Result: You save a total of 2.36 sq ft of floor space per unit. On 10 units, this means a saving of 23.6 sq ft.

Smaller size is only one of many advantages in this new Allis-Chalmers design. You also get full-front access, more room for optional features, a completely tested unit, and the ultimate in protection for men and machines.

For more information on how this new control design can help you, call your nearest Allis-Chalmers representative, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.



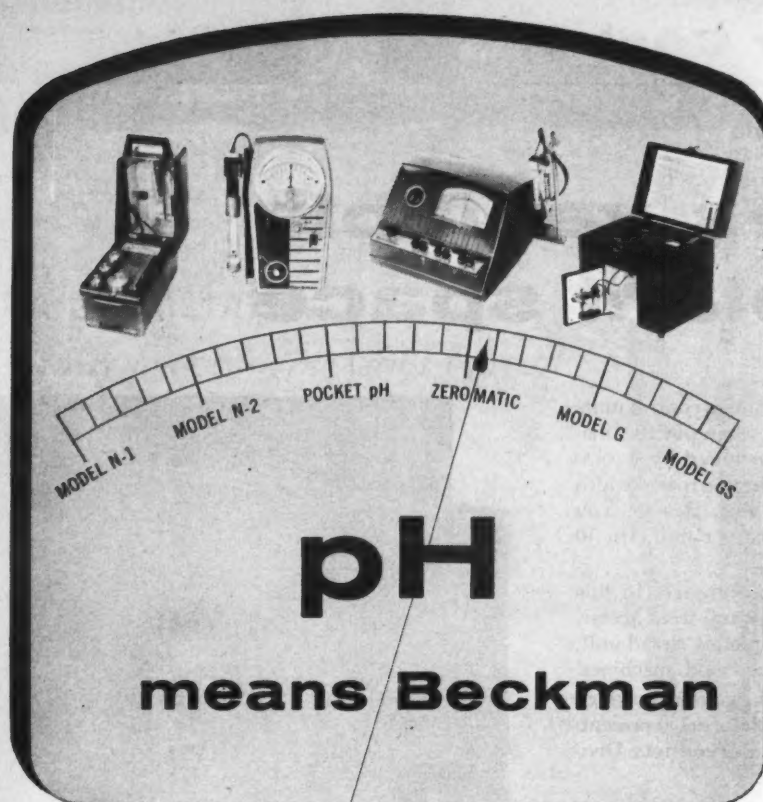
You get an extra unit in less space with Allis-Chalmers. 10 Allis-Chalmers units require only 340 inches.



# ALLIS-CHALMERS



A-5318



### a Beckman pH meter for any use...any budget

Producer of practical pH meters and electrodes since 1935, Beckman now offers the most complete line available anywhere. For laboratory, plant, or field—wherever pH measurement is important—there's a Beckman meter specifically suited to your job. Beckman meters range from a handy pocket model that sells for under a hundred dollars to the most precise laboratory model commercially available... the widest choice in size, price, construction, and precision.

When you're ready to talk pH meters, talk to the man who knows them best—your Beckman Dealer. For a brand new catalog describing pH meters and electrodes—and a list of Beckman Dealers—write for Data File L-32-11.

- POCKET pH:** pocket-size, portable, battery-operated, for quick accurate measurement.
- MODEL N-1:** rugged portable instrument for industrial application.
- MODEL N-2:** portable instrument, with carrying case, especially designed for field use.
- ZEROMATIC:** for quick, easy operation plus laboratory precision—the very latest in pH meters, with push-button operation, automatic zero-drift compensation, provision for recorder.
- MODEL G:** the recognized standard instrument for laboratory pH measurement.
- MODEL GS:** sensitive and readable to 0.0025 pH, for incomparable precision.

**Buffers & Accessories:** a full complement of buffers and accessories.

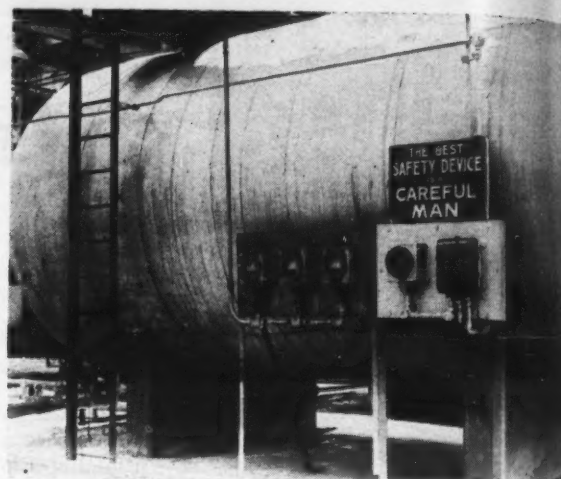
For automatic pH control instrumentation,  
contact Process Instruments Division.

**Beckman** Scientific Instruments Division  
2500 Fullerton Road, Fullerton, California  
a division of Beckman Instruments, Inc.

Responsible new positions in engineering, manufacturing, technical marketing. Write for Career File 10.

Check 2563 opposite last page.

## INSTRUMENTATION & CONTROL



Capacitance level indicator on sulfur dichloride tank at Esso's Bayway refinery

Free sulfur was plating out on conventional gage glasses after only three weeks of use, making them unreliable. Material was sulfur dichloride. Even simple cleaning and maintenance was difficult. Now...

## electronic level indicator...

- reduces cleaning costs
- is accurate

**Problem:** Measurement of liquid level of sulfur dichloride drum at Esso's Bayway refinery was a constant cause of difficulty. After only three weeks of use, free sulfur was plating out on the glasses and liquid levels could not be seen.

Sulfur dichloride, necessary for producing motor oil additives, is a noxious toxic material that gives off chlorine gas at atmospheric temperature and pressure. Any cleaning or maintenance of tanks containing this material required two or three men with gas masks. Because of difficulties of the task, job was scheduled at Bayway only when the tank was empty.

**Solution:** In June, 1956, an electronic level indicator was installed on one of Bayway's sulfur dichloride drums, ten feet in diameter and thirty feet long. Installation was

made on a test basis.

Instrument utilizes the capacitive bridge principle. Wall of a tank or drum becomes one electrode of a capacitor; a probe or sensing unit placed inside the vessel becomes the other. When the vessel is empty, capacitance of the system is low. (Air and most gases have a dielectric constant of one while granular solids and liquids have constants from two to 80.) Thus, as level within the tank rises, capacitance of the system increases. Level is determined by measuring capacitance increase.

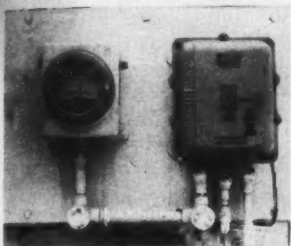
Probe or sensing unit in sulfur dichloride drum consists of a rigid ten foot stainless steel tube coated with Teflon. Tube extends from top to bottom of vessel. Low values of radio frequency energy are impressed on the probe by a sen-



active capacitance bridge in an electronic measuring unit mounted outside the vessel.

Electronic measuring unit includes a single tube and an electronic circuit containing the measuring bridge. Both probe and measuring unit are suitable for service in highly combustible atmospheres.

**Results:** Since installation, instrument has required no maintenance and has given accurate level information.



Close-up of level indicator. Installation is explosion-proof

Because of its reliability and accuracy, engineers are installing the instrument on other sulfur dichloride tanks in the refinery. Duplicate indicators, however, will be installed on the panelboard in refinery's control room, providing remote indication.

(Capacitance level indicators are product of Fielden Instrument Div., Robertshaw-Fulton Controls Co., 2920 N. Fourth St., Philadelphia 5, Pa.)

Check 2564 opposite last page.

#### Relays process data to help maintain set point

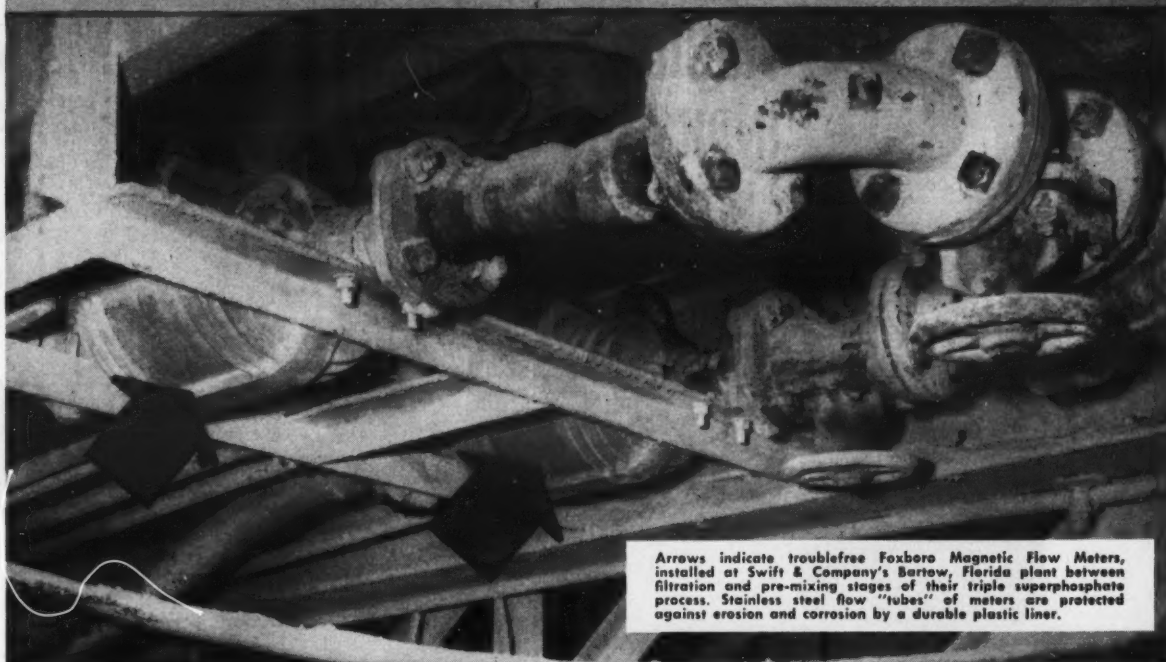
Pneumatic controller causes corrective action

**Uses:** Maintaining a given set point by relaying measured variables for subsequent corrective action with a final control element as diaphragm valve, lever motor, others.

**Features:** Plug-in installation permits mounting either at point of measurement or point of control.

**Description:** Pneumatic con-

## "Ornery" Phosphate Slurry Metered as Easily as Water!



Arrows indicate troublefree Foxboro Magnetic Flow Meters, installed at Swift & Company's Barrow, Florida plant between filtration and pre-mixing stages of their triple superphosphate process. Stainless steel flow "tubes" of meters are protected against erosion and corrosion by a durable plastic liner.

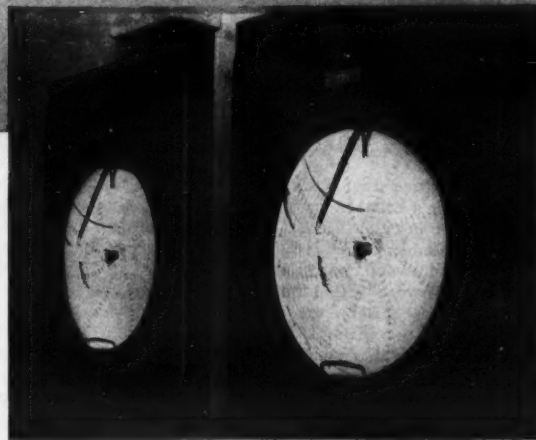
## ...by Foxboro Magnetic Flow Meters at Swift & Company

Measuring slurry is duck soup for two Foxboro Magnetic Flow Meters now used in the production of Swift & Company's Agricola plant food. Here's the story.

The company was shooting for uniform pre-mixing and quality control. Needed was an accurate means of measuring the flow of partially filtered phosphoric acid slurry. Orifice plates, or anything that restricted flow, eroded. Pressure taps quickly fouled. Even purged, long-cone Venturi tubes plugged! Solution? Electrical measurement with Foxboro Magnetic Flow Meters. Their smooth, pipe-like interiors simply ignore the suspended phosphate solids. There's no erosion, no fouling. Two flush-mounted electrodes "pick up" flow measurement... Foxboro Dynalog\* instruments record it directly on a linear scale chart. And these records are accurate to 1% of full scale!

Find out exactly how the Foxboro Magnetic Flow Meter works... how it can efficiently and accurately meter the "impossible" in your plant. Write The Foxboro Company, 8112 Neponset Ave., Foxboro, Mass., U.S.A.

\*Reg. U. S. Pat. Off.



By watching slurry flow rates on Dynalog Recorder charts, operators precisely regulate feed of  $H_2SO_4$  to the reactor tanks... permitting better quality control right down the line.

# FOXBORO

REG. U.S. PAT. OFF.

## MAGNETIC FLOW METERS

Check 2565 opposite last page.





## NEW LIQUIDOMETER INDICATOR

**SAVES SPACE  
ON INDUSTRIAL  
CONTROL PANELS**

### Twenty-inch dial in 3x10 1/4" case permits close readings

The new Liquidometer Model 216 Indicator gives the plant engineer a reliable, automatic reading of storage tank contents. Available in either vertical or horizontal design, the compact and highly readable Model 216 Indicator makes possible multiple installations on crowded control panels.

Teamed with Liquidometer's time-tested hydraulic transmission gaging system, the new indicator provides instantaneous remote indication of liquid levels—automatically. No outside power source is required. Virtually any liquid may be measured, and the indicator can be located up to 250 feet from the tank.

Engineered for dependability, the Liquidometer gaging systems highlight these design features:

- Maintenance free
- Integral temperature compensation
- Ease of installation—requires only one 2" diameter tank opening
- Safety—all gages Underwriters approved for hazardous liquids

For further details on the new Model 216 Indicator, write Dept. D.

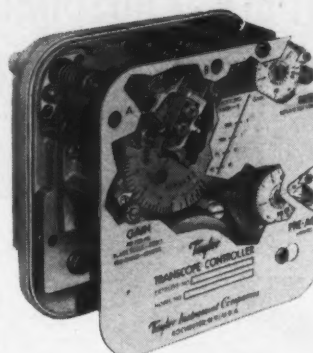


**THE LIQUIDOMETER CORP.**

SKILLMAN AVENUE AT 36th STREET  
LONG ISLAND CITY 1, NEW YORK

Check 2566 opposite last page.

## INSTRUMENTATION



Pneumatic controller relays measured variables

troller is compact (6 x 6 x 4 1/2"), uses motion-balance principle in operation. Multiple bellows and springs act on a common-force plate. Instrument has integral cut-off relay for mounting either at point of control or measurement.

Construction is of stainless steel, brass, and aluminum. Air consumption is low and instrument has a high degree of insensitivity to ambient temperatures. Unit is available with single or multiple control responses. Field conversion from one model to another in field is possible.

("Transcope" pneumatic controller is product of Taylor Instrument Companies, Dept. CP, 95 Ames Street, Rochester 1, New York.)

Check 2567 opposite last page.

### Controlled-volume pump proportions liquids in ml per hour

Duplex pump is separately adjustable on each side

Uses: Precision pumping, feeding, and proportioning liquids at micro-flow rates.

**Features:** Controlled-volume pump is duplex-designed, specifically engineered for pumping two liquids in equal volume or each at a different rate but in exact ratio.

**Description:** Pump is an assembly of two piston-diaphragm pumps mounted side by side on a common base and having a single drive. Pumps



## Is improper moisture in your products...

...adding to operating expense?  
☐ yes ☐ no

...slowing production for tests?  
☐ yes ☐ no

...bringing customer complaints?  
☐ yes ☐ no

**Any yesses? Then it will pay you to find out how the Granular Moisture Register model G5, operating on high frequency power loss principal, will indicate moisture content quickly and dependably, help solve those problems with...1-minute tests on the spot!**  
• **Practical Accuracy Guaranteed!**  
• **No skilled technicians!** • **Two weeks free trial!**

**Most granular products such as:**

Ammonium Nitrate • Ammonium Sulphate  
• Toilet Soaps • Plastic Molding Compound  
• Polyvinyl Chloride • Ammonium Perchlorate  
• Sodium Bicarbonate • Polyethylene Resins

**DOZENS MORE**

**Moisture Register Instruments**

Moisture Register Co., Dept. CP  
P. O. Box 910, Alhambra, Calif.

☐ We are interested in 2 weeks free trial offer. Send additional information regarding Model G5.

We will want to test \_\_\_\_\_

in a moisture range from \_\_\_\_\_ % to \_\_\_\_\_ %.

Firm Name \_\_\_\_\_

By \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Check 2568 opposite last page.

CHEMICAL PROCESSING

## INSTRUMENTATION

have no stuffing box, packing gland, or running seal to come in contact with liquid being pumped. Product is isolated from all pumping parts by hydraulically-balanced diaphragm.

Pumping rate is adjusted separately for each side, being handset on a dial indicator calibrated in 1000 increments. Setting can be adjusted in infinite increments while pump is idle or operating. Adjustment can be over range of 0 to 100% capacity.

Two models are available. One is rated for pressure to 1000 psig with maximum flow rate of 2300 ml per hour. Another is rated at pressures to 2000 psig with maximum flow rate of 1040 ml per hour.

(Pulsafeeder Model LD is product of Process Equipment Div., Lapp Insulator Co., Inc., LeRoy 4, N. Y.)

Check 2569 opposite last page.

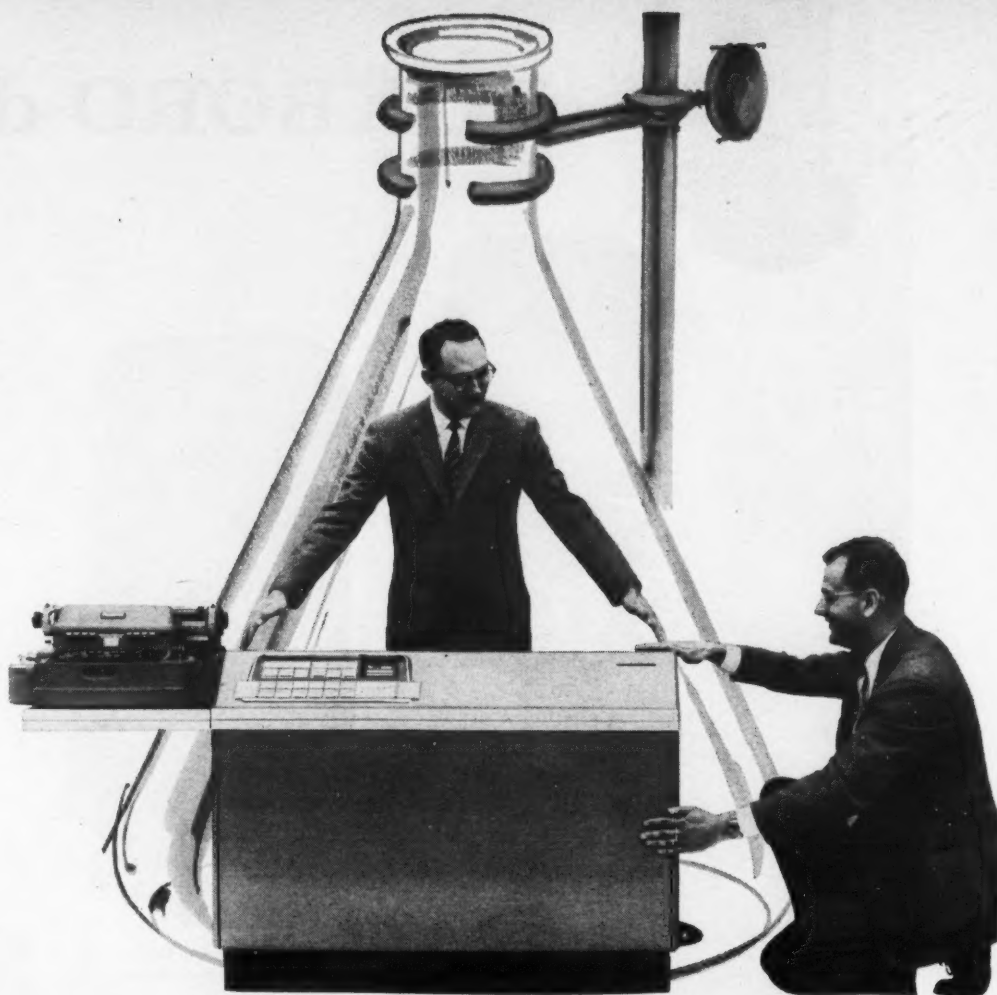
### Electronic timers

Booklist of nine pages contains information on time-interval meters (electronic timers) and how to make time-interval measurements. Diagrams, photos, and schematics describe techniques for using meters. Data File 112—Berkeley Div., Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif.

Check 2570 opposite last page.



"I'd like you to break it gently to the other elves."



## Take the tedium out of correlation studies with this powerful electronic computer ROYAL PRECISION LGP-30

### Large capacity . . . easily programmed and operated . . . mobile . . . low in cost

Compact, simple to use . . . Royal Precision LGP-30 brings high-speed electronic computation *right to your desk* . . . relieves you of the tedium of statistical analysis in such areas as research and product development, quality control and process control. And at the lowest cost ever for a complete computer system!

**Faster answers; unusual capacity.** Used wherever you want it, LGP-30 operates from any conventional wall outlet, is self-cooled. Providing fast, effortless answers for all types of statistical studies—correlations, analysis of variance, regression analysis, curve-fitting—LGP-30 gives you speed and memory (4096 words) comparable to computers many times its size and cost . . . stored-program operation for complete flexibility. Result: you save valuable time . . . handle more assignments . . . go forward to truly *creative* work.

Easy to operate and program. Controls have been so thoroughly simplified, LGP-30 may be operated with only minimum computer experience. Answers are printed out directly . . . do not require deciphering. Programming is easily learned. A library of sub-routines, plus programs for a wide variety of applications (including Box technique for experimental design), are available.

**Wide range; exceptional value.** The most powerful computer of its size yet developed, LGP-30 is the greatest value in today's market. Remarkably small initial investment is combined with low operating and maintenance costs. Service facilities are available coast-to-coast. For further information and specifications, write Royal McBee Corporation, Data Processing Equipment Division, Port Chester, N. Y.

## ROYAL MCBEE

WORLD'S LARGEST MANUFACTURER OF TYPEWRITERS  
AND MAKER OF DATA PROCESSING EQUIPMENT

Check 2571 opposite last page.

# FOXBORO d/p CELL

unequaled -



Simplest installation — orifice flange top connections at standard spacing, are provided at both ends.



Drain and vent holes at lowest and highest points on both sides.



Purged cover protects transmitter from weather, dust, and fumes.

**Over  
60,000  
now in use!**

No zero drift . . . positive overrange protection . . . high sustained accuracy even under the most punishing operating conditions. No wonder over 60,000 Foxboro d/p Cell Transmitters have been installed since they were introduced in 1948. By introducing the modern concept of high

speed flow measurement and control, these differential pressure transmitters have revolutionized many an industrial process. Bulletin 13-11A shows how — and portrays the benefits the d/p Cell Transmitter offers you. Write The Foxboro Company, 8112 Norfolk Street, Foxboro, Mass., U.S.A.

## FOXBORO

REG. U.S. PAT. OFF.

**FIRST** in Flow Measurement and Control



# FLOW TRANSMITTERS...

in accuracy, stability and performance




All-metal construction; body of 316 stainless or rustproofed carbon steel. New self-damping, stainless steel measuring element.

Fully adjustable ranges: from 0-20" to 0-250"; and 0-200" to 0-850" water differential. Calibrated accuracy  $\pm 1/2\%$ .

For more information on product at left, specify 2572 see information request blank opposite last page.






**PROTECTING  
GRANULAR  
POLYETHYLENE  
from METALLIC IMPURITIES**

Acheson Dispersed Pigments Co., Philadelphia, produces black polyethylene concentrate in granular form from which insulation compounds for electric cable and wire are made. To protect the purity of their products they use the RCA Metal Detector, thus preventing rejected shipments due to metallic contamination. Presence of metal in the insulation would render the cable useless. Metal particles in their products are also a clue to defective machinery. By analyzing the rejected materials they can go back to the machine and repair it before serious damage results.

Both magnetic and non-magnetic metals are detected as this electronic marvel "looks" below the surface and spots automatically any that could prove harmful to machinery, products, or reputation.

*Why let stray metal cut into your profits?  
Get the whole story—mail coupon.*



MARK OF **RCA** QUALITY

**ELECTRONIC  
METAL DETECTOR**

Radio Corporation of America  
Dept. A-297, Building 15-1, Camden, N.J.  
In Canada: RCA VICTOR Company Limited, Montreal

☐ Please send me complete information on the RCA Metal Detector for use in \_\_\_\_\_

☐ Have RCA field representative contact me.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

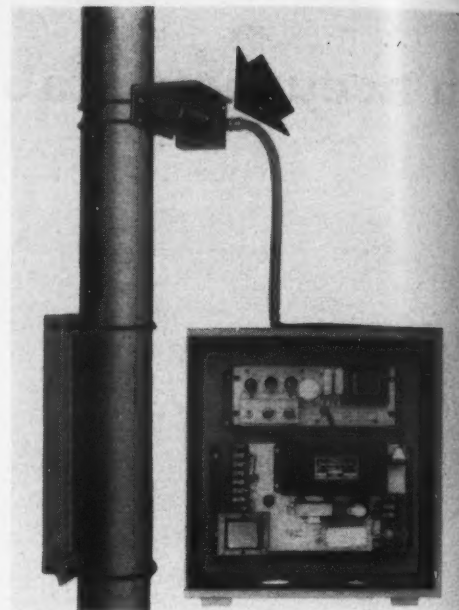
ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

Check 2573 opposite last page.

## INSTRUMENTATION & CONTROL

Designed in conjunction with AEC, radiation-type level indicator and controller has no moving parts. Potentially a trouble-free device, it will measure densities . . . specific gravities . . . or level of interfaces.



## Solves difficult problems of level control— *yet is easily installed*

**Uses:** Never in contact with process material or affected by corrosive liquids, recently developed level indicator and controller has already been used for high and low level control of crushed ore or powdered material in process vessels. Because of simplicity of design and potentially extreme reliability under severe operating conditions, instrument is easily adapted to solve difficult problems of level control.

Adverse conditions of temperature, vibration, which might make use of floats or sight gages unfeasible, will not ordinarily affect accuracy of instrument.

In addition, with use of suitable source-detector installations and auxiliary equipment, as calibrated recorders, instrument may also be used to measure densities . . . specific gravities . . . or level of interfaces.

**Features:** Since no part of instrument comes into contact with process materials, radiation-type level indicator and con-

troller cannot be affected by corrosive materials. And — installation is simple and easy. Drilling of holes or welding of brackets are unnecessary. Instrument can be easily removed for use in another location.

**Description:** Designed in cooperation with Atomic Energy Commission, level indicating equipment will record and control level of any process material, from distillates to slurry of finely crushed ore, over a wide range. Operational points can be from 6 to 48 inches apart. Recording and controlling devices can be located up to 2000 feet from point of actual measurement.

Although detector and radiation source holder will vary according to needs of installation, major components of system include source of gamma radiation, detector assembly, power supply unit, and recorder-controller. Source of radiation is Cobalt-60 (half-life 5.3 years).

Operating on principle that radiation

Photo sh  
control.  
mounted

MATERIAL DENSITY  
10  
15  
20  
MAX

Chart of  
measured  
through  
length sh

given c  
sorbed  
amount  
physical  
path le  
Geiger

For l  
control  
density  
ered to  
of gam  
then b  
path le  
to leve

For c  
gravity  
tion wi  
charact  
terial c  
directe  
sible.

Sourc  
mounte  
pipe w  
specific  
are rec  
used fo  
is moun  
line ap  
above  
source.  
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Larg  
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Photo shows installation for level control. Note detector (arrow) is mounted above radiation source at left

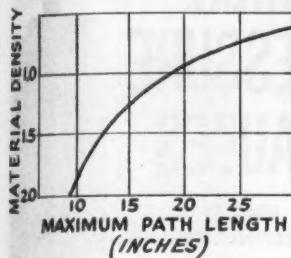


Chart of density of materials being measured and radiation path length through material. Maximum path length should not exceed 90 percent absorption

given off by source is absorbed by process material in amount dependent upon its physical characteristics and path length, instrument uses Geiger counter tube.

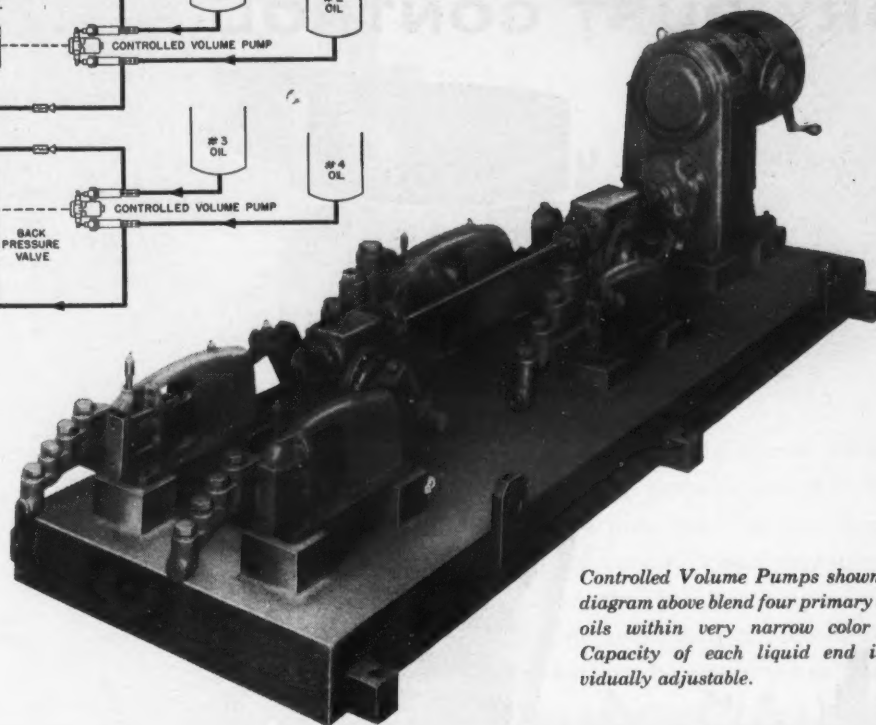
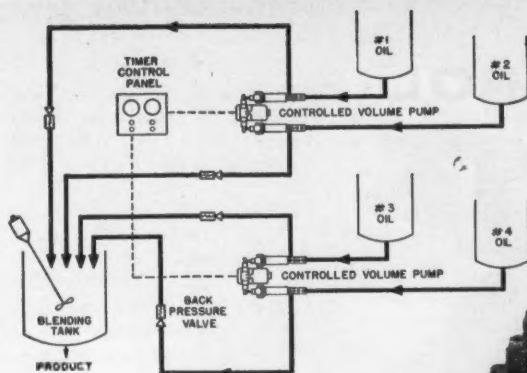
For level measurements or control of process material, density of material is considered to be constant. Amount of gamma ray absorption will then be dependent only on path length and proportional to level of material.

For density and specific gravity applications, absorption will vary only as physical characteristics of process material change since radiation is directed in shortest path possible.

#### Installation

Source and detector are mounted at point on process pipe where level, density, or specific gravity measurements are required. If equipment is used for level control, detector is mounted on process pipe line approximately 1½-5 feet above calibrated radiation source. Distance depends upon diameter of material column. Large U-bolts hold both source and detectors to process pipe.

If unit is installed for density and specific gravity measurements, both radiation



Controlled Volume Pumps shown in the diagram above blend four primary varnish oils within very narrow color limits. Capacity of each liquid end is individually adjustable.

## Controlled Volume Pumps ratio and blend chemicals exactly...easily...economically

You can be sure of end-product uniformity when you formulate chemicals with Controlled Volume Pumps.

These positive-displacement pumps continuously maintain fixed ratios among all ingredients in a mix. They meter as they pump with an accuracy within  $\pm 1\%$ . A single pump can have from three to ten liquid ends.

On the pump shown above, for example, one variable speed motor drives four liquid ends. Capacities differ for all four liquid ends, yet fixed ratios can be established among all capacities. An increase in motor speed produces a corresponding increase in the quantity of chemical metered by each liquid end. The exact ratios of each chemical to another remain constant. Basic ratios can be changed by manual adjustment of stroke lengths on any or all four pumping units.

With capacities ranging to 1350 gallons per hour per liquid end, Milton Roy Controlled Volume Pumps are applicable to both pilot plant and production use. Write for Bulletin 1253, "Controlled Volume Pumps in Process Instrumentation."

MILTON ROY COMPANY, Manufacturing Engineers,  
1300 East Mermaid Lane, Philadelphia 18, Pa.



Engineering Representatives in the  
United States, Canada, Mexico, Europe,  
Asia, South America, Africa and Australia.

Check 2574 opposite last page.



Continuous Trouble-Free Operation for...

## DRY DUST CONTROL



If you're airing a dust control problem for industrial process or community relations... consider the factual benefits of field-proven Ducon Cyclones for dry collection. Hundreds of leading plants throughout the world, handling a wide variety of products, have found that Ducon dry-type collectors provide the continuous operation needed to capture nuisance dusts and recover usable product... most effectively, and with no processing down-time for sludge clearance. Consult a Ducon field engineer who may have a ready answer for your specific dust control problem.

Write today for descriptive Bulletin 49



**Ducon**

THE Ducon COMPANY

147 EAST SECOND STREET • MINNEAPOLIS, MINN.

Sales Representatives in Principal Cities

In Canada: The Ducon Company of Canada, Ltd., 1000 Bloor Street West, Toronto

Designers and Manufacturers of Dust Control Equipment

CYCLONES • CENTRIFUGAL WASH COLLECTORS

Check 2575 opposite last page.

## INSTRUMENTATION

source and detector are mounted on same level. Four, long, threaded, rods hold mounting brackets firmly against process pipe line or vessel.

If anticipated temperatures are in excess of 200°F, asbestos or high-temperature insulation should be used between pipe and detector mounting flange.

### Operation

Once equipment is calibrated, operation is simple. Amount of indication will depend on material within process vessel measured. Signal put out by Geiger counter is in form of voltage pulses, with frequency proportional to radiation intensity. Recorder indicates relative intensity of radiation received and, consequently, densities, specific gravities, or level of interfaces.

Instrument operates on 105-125 v AC. Indicator accuracy is  $\pm 2$  percent of full scale.

(Radiation instruments for level measurement and density control are products of Instruments, Inc., 122 N. Madison, Tulsa 6, Okla.)

Check 2576 opposite last page.

### Thermometer recorders have uniform accuracy over scale

Mercury-actuated elements are stable

Uses: Series of thermometers include recorders, recorder-controllers, indicators, and indicator-controllers.

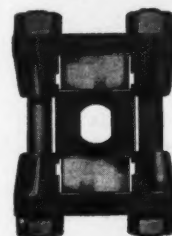
Features: Recorders and recorder-controllers have large 12-inch easy-to-read charts. Both set point and controlled variable are shown by indicators and indicator-controllers.

Description: Series of instruments uses mercury-actuated sensing elements for maximum stability over wide ranges of temperature. Instruments use plug-in chassis and are available in a number of control forms. Eight different control forms include two-

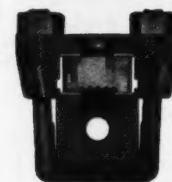
*Strahman*

## HIGH PRESSURE GAUGES

USED IN  
REFINERIES  
AND  
CHEMICAL PLANTS  
THROUGHOUT  
THE WORLD



THRU VISION



REFLEX

Single or Multiple  
Sections

TUBULAR

Gauge Cocks

Large Chamber  
Reflex Gauges

Heated or Cooled  
Gauges

SEND FOR  
COMPLETE  
CATALOGUE

STRAHMAN VALVES, Inc.  
16 Hudson St., New York 13, U.S.A.

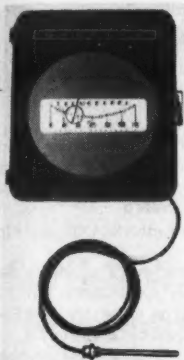
Check 2577 opposite last page.

CHEMICAL PROCESSING

## INSTRUMENTATION

position "anticipatory" time-proportioning control, electric proportioning "stepless" control, and others. Most have SPDT action.

Instruments are available either as surface or flush-mounted units. Overall dimen-



Temperature indicator has easily-read dial

sions are  $16\frac{3}{4} \times 14 \times 8\frac{3}{8}$ ". Temperature range of series is from  $-40^{\circ}$  to  $950^{\circ}\text{F}$ .

(Series 4000 thermometers are product of Wheelco Instruments Division, Barber-Colman Company, Dept. CP, Rockford, Ill.)

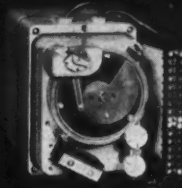
Check 2578 opposite last page.

### Digital computer survey for new users

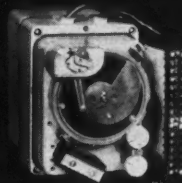
Prospective users of electronic digital computers will be aided in choice of proper equipment by Army's new report of engineering and programming characteristics of 103 commercially available systems. The 439-page book provides data for applications, cost, personnel requirements, and power and space requirements for specific systems. Suggestions are included on modifications and improvements useful to present operators of digital systems. Reliability problems are also dealt with. To obtain report PB 111996-R, "A Second Survey of Domestic Electronic Digital Computing Systems," remit \$7 direct to office of Technical Services, US Department of Commerce, Washington 25, D. C.

DECEMBER 1957

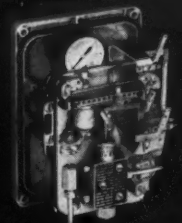
Recording Unit for Variable 1



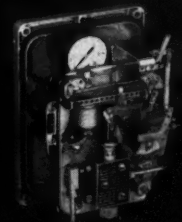
Recording Unit for Variable 2



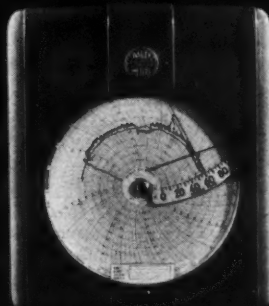
Controlling Unit for Variable 1



Controlling Unit for Variable 2



Units added to Recorder-Controller as needed



## Bailey Recorder is key to "step-by-step" automation

When you are pioneering a new process and don't know all the answers, complete automation is seldom practical. The first step is to identify your variables and measure them. Nothing does this job better than a Bailey Recorder. One instrument can record any four variables that can be converted to electric or pneumatic signals.

Once you get a better understanding of the variables in your process, you will want to add controls and feed back your measurements. Here's where the versatility of the Bailey Recorder comes into play. For the same Bailey instrument you use to record variables is designed to accommodate plug-in control units.

When you use a Bailey Recorder, you can build your instrumentation along with your process. At the start, you use only the plug-in units for recording. Then you add plug-in controls as you see the need for them.

For the complete story of how you can use a Bailey Recorder for step-by-step automation, see your Bailey Engineer.

G-42-1

## Instruments and controls for power and process BAILEY METER COMPANY

1074 IVANHOE ROAD • CLEVELAND 10, OHIO

In Canada — Bailey Meter Company Limited, Montreal



Check 2579 opposite last page.

# CAMBRIDGE GAS ANALYZERS

at the  
26th EXPOSITION OF CHEMICAL INDUSTRIES  
BOOTH NO. 376



GAS ANALYZERS, single and multi-point for use in a wide variety of chemical and processing industries.

PORTABLE pH METERS, for chemical, laboratory and plant use.

SINGLE AND MULTI-POINT pH INDICATORS, RECORDERS AND CONTROLLERS.

SULPHUR DIOXIDE ANALYZER, for process control.

COMBINATION DISSOLVED OXYGEN AND DISSOLVED HYDROGEN ANALYZER, for continuously and simultaneously recording the oxygen dissolved in boiler feedwater and the free hydrogen in steam condensate.

COMBINATION OXYGEN, CARBON-DIOXIDE, AND COMBUSTIBLES ANALYZER, for kiln gas analysis.

HYDRAZINE ANALYZER, for indicating and recording  $N_2H_4$  in boiler feedwater.

CARBON DIOXIDE, HYDROGEN, CARBON MONOXIDE ANALYZER-RECORDER, for blast furnace top gas analysis.

Other precision instruments widely used in a variety of industries will be shown: Needle, Ball and Mold Pyrometers; Moisture Indicators; Paper Hydroscope; Exhaust Gas Testers; Portable Hydrogen Purity Analyzer; Nuclear Measuring Instruments, Fabric Permeameters, etc.

Visit us at Booth 376 or send for descriptive literature mentioning instruments in which you are interested.

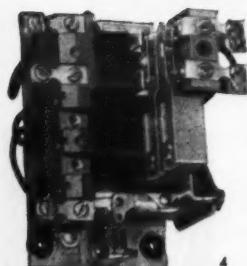
**CAMBRIDGE INSTRUMENT COMPANY, INC.**  
3512 Grand Central Terminal, New York 17, N. Y.

PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

Check 2580 opposite last page.



*all Electric* **FLOATLESS  
LIQUID LEVEL  
CONTROLS**



The original—pioneered by B/W in 1933. No floats! No moving parts in liquid. Literature describes relays and starters, automatic starter and relay combinations, multiple pump controls, special controls and panels and many application diagrams.

Controls not affected by pressures, temperatures, acids or caustics. Remote control if desired. Ice free electrodes where necessary.

WRITE FOR CATALOG

**B/W CONTROLLER CORPORATION**

2204 E. Maple Road, Birmingham, Mich.

Check 2581 opposite last page.

## INSTRUMENTATION

### Valve position indicator

Manufacturer's valve position indicator that automatically signals control board apparatus when opening or closing cycle, is described and illustrated in two-page bulletin. Specifications and technical data are contained. Valve position indicator bul—Bridgeport Thermostat Div., Robertshaw-Fulton Controls Co., Milford, Connecticut.

Check 2582 opposite last page.

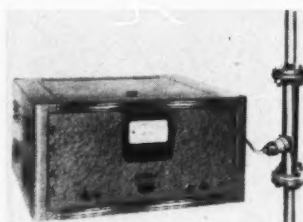
### Smooth-bore flowmeter measures and totals mass rate

Operates by measuring rate of heat transfer

Uses: Measuring mass flow rates of fluids in laminar flow. Small flow rates of a few pounds per hour and less can be measured. Also, flow rates of highly viscous materials, as glues, can be handled.

Features: Flowmeter offers an uninterrupted flow path, measuring and totalizing mass flow rate. Scale is essentially uniform.

Description: Instrument operates by measuring rate of heat transfer through boundary layer of fluid. Heat is pro-

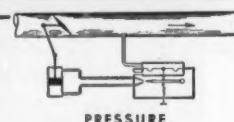


Mass flowmeter measures low and viscous flow

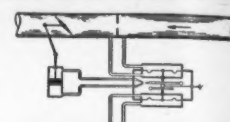
duced by a heater coil located between two thermometer coils. Differential temperature between two thermometer coils determines voltage and, consequently, wattage, supplied to heater coil. Flowrate is indicated by a properly calibrated wattmeter. Total flow is indicated by a watt-hour meter.

Flowcell can be fabricated of stainless steel, copper, or

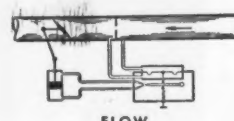
## For Pressure, Flow or Proportion Control THE ASKANIA JET PIPE REGULATOR



PRESSURE



PROPORTION



FLOW

...the simplest, accurate, long life solution to automatic control problems.

What are the IDEAL requirements for a regulator controlling pressure—flow—blending and other variables?

### Do they include:

1. Power to operate the heaviest valves even under sticking conditions
2. Unimpeded Operation in Freezing Weather
3. Low Maintenance
4. Rugged Construction
5. Dependability
6. Long Life
7. Accuracy
8. Speed

All these features are typical of all ASKANIA Jet-Pipe Regulators.

For further information on the type of regulator best suited for your problem, send today for Bulletin No. 139 and 155. Write the ASKANIA REGULATOR COMPANY, 242 East Ontario St., Chicago, Illinois

## ASKANIA REGULATOR COMPANY

"CONTROLS FOR INDUSTRY"

HYDRAULIC, ELECTRONIC CONTROLS & SERVOS, GENERAL SYSTEMS, ENGINEERING & COMPUTER SERVICE, VALVE ACTUATORS & CYLINDERS

A SUBSIDIARY OF



Check 2583 opposite last page.

## Announcing the New Jerguson MAGNETIC GAGE For Liquid Levels

An important advancement in liquid level observation for plants with dangerous explosive or inflammable conditions.

- Safety design seals against escaping gases;
- Measuring mechanism in stainless steel chamber.
- Scale mounted outside chamber; magnetically actuated through chamber wall.
- Distinct, accurate level shown in red contrasted with silver above.
- Job designed; correlating pressure, temperature, and specific gravity.
- For pressures up to 2500 lbs. @ 600° F.
- Can also be used for interface.

Write for folder on  
Jerguson Magnetic Gages.

Patent  
Applied  
For

Gages and Valves  
for the Observation  
of Liquids and Levels

**JERGUSON**

JERGUSON GAGE & VALVE COMPANY  
100 Adams Street, Burlington, Mass.

Offices in Major Cities. In Canada: Peacock Bros. Ltd.

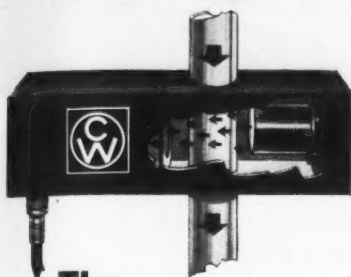


Check 2584 opposite last page.

CHEMICAL PROCESSING



## for CONTINUOUS PROCESS DENSITY MEASUREMENT



### The Curtiss-Wright Non-Contact DENSITY GAUGE

To measure the density of moving liquids, gases, slurries and powders in pipes or tubes or on conveyors, Curtiss-Wright DG3 Density Gauge utilizes controlled nuclear rays to provide accuracies of better than  $\pm 1\%$  in density measurement.

The small, compact measuring head is designed to fit various pipe sizes; it can be mounted on the line while remaining circuitry can be remotely placed at regular plant control stations. Highly stable, the measuring system employs direct AC amplification and will measure with a resolution of  $\frac{1}{4}\%$  over a range of 0.5-1.5 gm/cm<sup>3</sup>.

The DG3 system features standard interchangeable component drawers for easy, economical maintenance. Choice of dial indication or standard strip chart recorder presentations. The system may be combined with the Curtiss-Wright Proportional Automatic Controller to automatically adjust mixture ratios.

Complete information on the Curtiss-Wright Density Gauge available on request.

#### INDUSTRIAL CONTROL SALES



Check 2585 opposite last page.

DECEMBER 1957

#### INSTRUMENTATION

other materials. Diameter can be  $\frac{1}{4}$ " and up. Remote indication is possible. Flow cell length is generally 1 ft. Power required is 100-130v AC.

(Type FM 100 flowmeter is product of Industrial Development Laboratories, Inc., 17 Pollock Ave., Jersey City 5, New Jersey.)

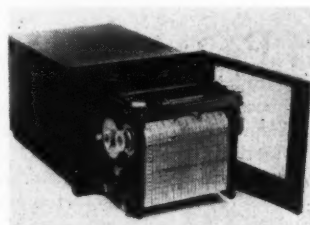
Check 2586 opposite last page.

#### Small size stripchart accommodates 2 pens

Both pens write margin to margin on 5-inch chart

Uses: Producing two continuous records on single 5-inch stripchart.

Features: Device uses two pens, both writing margin to margin. Specifications are 0.5% accuracy on each pen, sensitivity of 0.14% of scale span, maximum source impedance of 1000 ohm per mv of span, millivolt or thermocouple calibration.



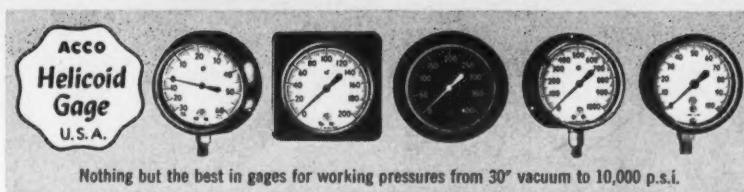
Both pens write margin to margin on single 5-inch stripchart

Description: Case extends only 13 inches behind panel face. Instrument is available with one front set-limit switch and 3 back set-limit switches on each pen. Amplifiers are completely transistorized.

Optional features include transmitting slidewires, quick-change or manual-change gears for 3-speed chart drive, selsyn motor of synchronous motor chart drive, automatic reference junction compensation, table or panel mounting.

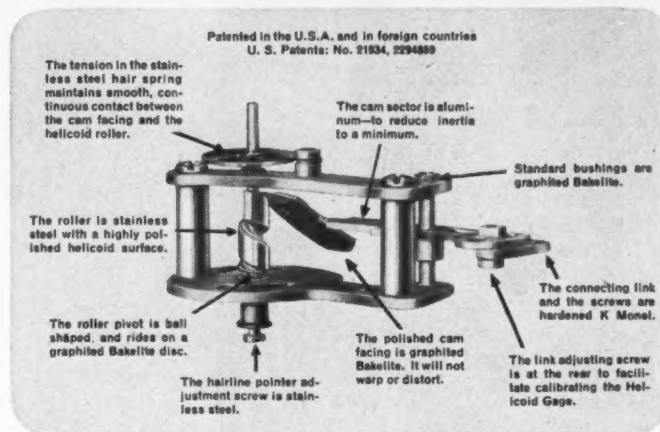
(Two-pen miniature recording potentiometer is manufactured by Westronics, Inc., Dept CP, 3605 McCart, Fort. Worth Tex.)

Check 2587 opposite last page.



Nothing but the best in gages for working pressures from 30" vacuum to 10,000 p.s.i.

## These details of Helicoid gage design assure longer life and enduring accuracy



The superiority of Helicoid Gages is most evident in severe service—wherever a gage is subjected to violent pressure pulsations or severe mechanical vibrations.

The sustained accuracy of Helicoid Gages over millions of cycles is explained by the details of design and construction of the Helicoid movement shown above. Such Helicoid features—protect against wear and corrosion and assure sensitivity, sustained accuracy and trouble-free operation.

#### The Chemical Gage

The Helicoid Chemical Gage has a guaranteed accuracy of plus or minus 1%. It is applicable for working pressures from 30" vacuum to 5000 p.s.i. and temperatures to 400° F. It is particularly suitable for chemicals and other viscous fluids which might clog or corrode a Bourdon tube. Pressure and/or vacuum is transmitted directly to the indicating gage element through deflection of a Teflon or Kel F sealing diaphragm.



#### Tubes built for millions of pressure pulsations

To fit the wide range of applications, Helicoid Bourdon tubes are available in four materials—alloy steel, K Monel, stainless steel and phosphor bronze.

All Helicoid tubes are made from seamless tubing and are carefully designed to give maximum torque and minimum stress. When used within the dial range, they will withstand many millions of pressure pulsations and will not stretch, leak or crack.

For complete information on the Helicoid line of gages write for Catalog G-52



Helicoid gives you all these features at prices that are competitive in the quality gage field.

#### Helicoid Gage Division AMERICAN CHAIN & CABLE

929-P Connecticut Avenue • Bridgeport 2, Connecticut



Check 2588 opposite last page.

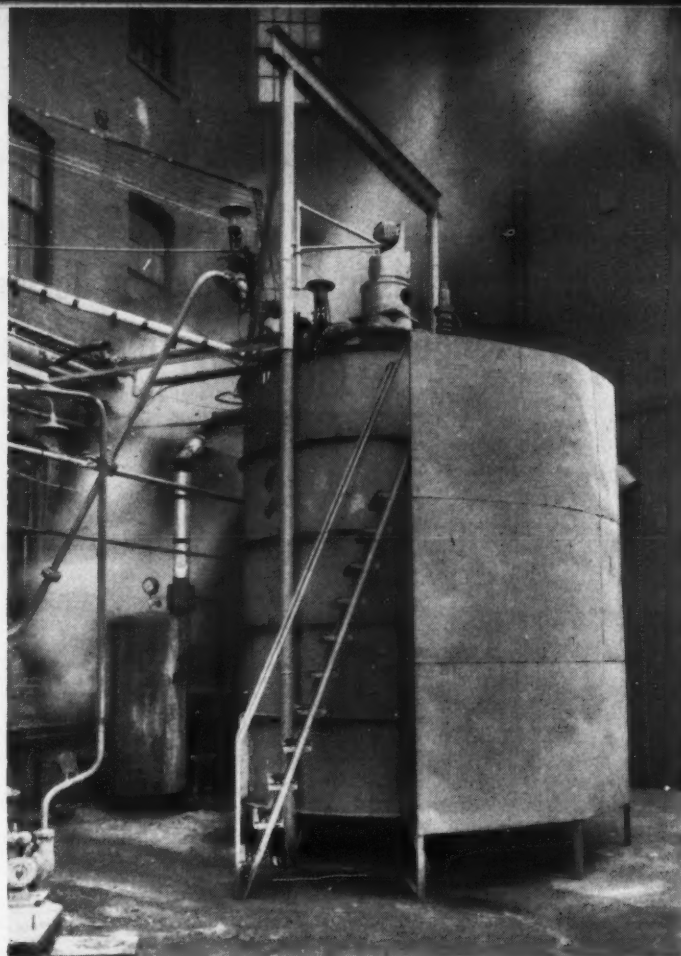


Fig 1—Vinyl-coated shield withstands nitric acid fumes, steam vapors

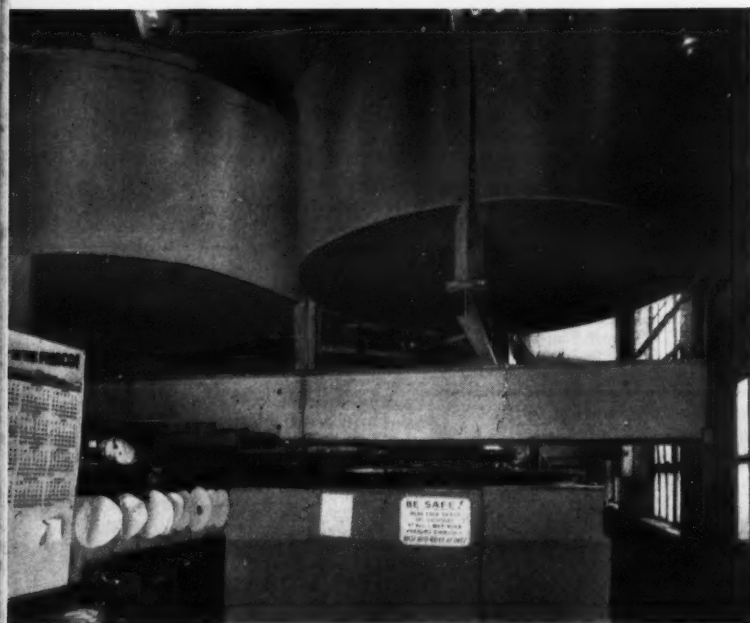
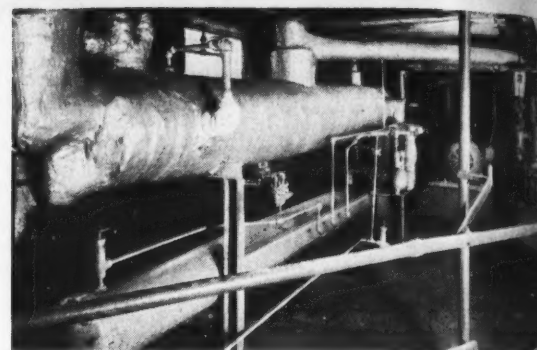


Fig 2—Here vinyl coatings must resist both acid and caustic



Since variety of coatings formerly used were not satisfactory for the oils, acids, caustic, solvents, steam, and salty air encountered —

## chemical plant standardizes on vinyl coatings

GORDON WEYERMULLER, Associate Editor  
With ROBERT D. BATCHELAR, Assistant Plant Engineer  
Nopco Chemical Company, Harrison, New Jersey

**P**roblem: Too many different coatings were being used at the Harrison, N. J., plant of Nopco Chemical Company, to achieve effective protection from the aggressive corrosives in the plant. It was difficult to select the best coating for a given area from among the many available. Primer being used had too much gloss — did not give a good bond with finish coats.

The Nopco plant manufactures oil derivatives for the tanning, paper, textile, and cosmetic industries — along with vitamin products and fine chemicals. In making these materials, it is necessary to handle caustic, nitric acid, hydrochloric acid, alcohol, sulfuric acid, ammonia, and other corrosives. In addition, plant is subjected to salty air from the nearby Passaic River. A coating system was required that could withstand these severely corrosive conditions.

**Solution:** Several years ago the plant started using a coating system based on vinyl chloride-acetate copolymers. Procedure follows:

Surface preparation consists of

chipping, scraping, or wirebrushing — depending on conditions. Usual primer consists of a vinyl resin-zinc chromate-acidic material compounded for use over bare metals. It is brushed on, providing a dull surface, an excellent bonding for finish coats.

In some cases another type of primer is used which is designed for use over other coatings which are not removed prior to repainting. This primer does not tend to lift previously applied coatings. It is preferable for prime coat to dry over night, but finish coats have been applied the same day.

From one to three finish vinyl coats are applied. Although brushing is used for piping and most process equipment, roller coating is used for large tanks. Accompanying photos show some typical examples of how the vinyl coatings are used at Nopco:

Fig 1 shows a steel shield surrounding a tank containing nitric acid. This shield is subjected to nitric acid fumes and steam vapors from the reaction vessel. Shield was recently recoated with vinyls. Previous vinyl coatings lasted three years.





**CORROSION  
CONTROL**

Fig. 3—Acids and solvents haven't hurt vinyl coatings in this basement area



Fig. 4—Example of the catastrophic effect of corrosives on equipment left unprotected or improperly coated

Fig 2 shows lead-lined panning tanks in an area where vinyl coatings have given several years service. In this area various oils are treated with acids and alkali. Use of caustic and ammonia in an acid solution held in tanks shown in photo, provides additional corrosives and fumes to the area.

Fig 3 illustrates equipment coated with vinyls for three years under corrosive conditions. This is view of basement of building used for processing fine chemicals. Area is subjected to HCl, alcohol, and ammonia fumes from refrigeration machine. Wet conditions, steam vapors, and solvent vapors must also be withstood.

Fig 4 is an example of the effect of corrosive fumes at Nopco on equipment left unprotected or coated with materials not designed for conditions. Area is subjected to oil, sulfuric acid, steam, and ammonia. This area will be painted with vinyl coatings in near future.

Results: Vinyl coatings in

use at Nopco have given several years service in spite of the wide variety of corrosives encountered. Plant has standardized on vinyl coatings, for practically all applications.

(DEL vinyl coatings are product of David E. Long Corp., 220 E. 42nd St., New York 17.)

Check 2589 opposite last page.

(Vinyl resins used in coatings are product of Bakelite Co., Div. of Union Carbide Corp., 30 E. 42nd St., New York 17.)

Check 2590 opposite last page.

#### Glass pipe drainlines

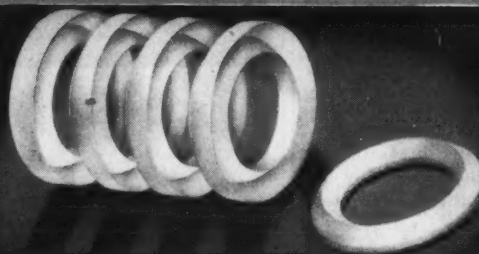
Bulletin of eight pages on manufacturer's brand of glass pipe shows typical drainline installations in chemical process industries. Installation data and information on representative glass fittings are presented. Bul PE-30 — Corning Glass Works, Corning, New York.

Check 2591 opposite last page.

## Chemiseal® Packings

MADE OF DU PONT TEFLON

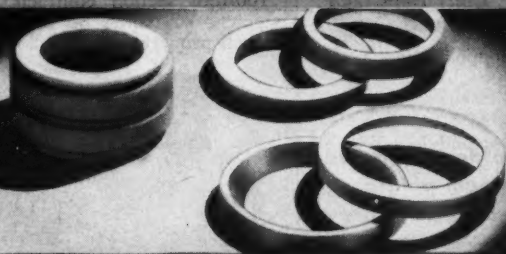
**Last Months Instead of Hours  
in Corrosive Service**



**V-Rings.** Distinctive tapered V design offers greater flexibility and resiliency, providing necessary seal at low gland pressure and reducing torque on valve stem. Antihesive properties guard against valve packing "freeze". Supplied in sets with or without TEFLON® square-end adaptors.



**Cup and Cone Rings.** Cones deform inwardly to seal at the spindle, while cups expand outwardly against stuffing box wall, effecting a tight seal at low gland pressure with minimum friction on valve stem. Antihesive properties make this packing ideal for emergency shut-off service.



**Wedge Rings** seal at unusually low gland pressure required for valves manufactured from Havel, Karbate, ceramics, etc. Provide space for thermal expansion, suiting them for slow-speed pumps, agitators, auto-claves, etc. Adaptable to spring-loading if desired. Write for Catalog AD-155.

U.S. Pat. Pending

**United States Gasket Company**  
Camden 1, New Jersey

**United States Gasket** *Plastics Division*

OF THE GARLOCK PACKING COMPANY

Check 2592 opposite last page.



## CORROSION

### Zirconium welding fittings reported to be first of kind forged

**Uses:** For application in chemical and nuclear fields where severe corrosion conditions prevail.

**Features:** Materials have very low thermal cross section (0.18 Barns) and high degree of stability under radiation.

**Description:** Fittings are reported to be the first forged of zirconium and Zircaloy 2. They have an outside diameter



Zirconium and Zircaloy 2 elbows resist wide variety of corrosives

of 1.5" and 0.065" wall. Laboratory tests and field experience show that fittings possess relatively good strength up to moderately high temperatures.

(Zirconium and Zircaloy 2 fittings are product of Tube Turns, Div. of National Cylinder Gas Co., Dept. CP, Louisville 1, Ky.)

Check 2593 opposite last page.

### Formulation developments make aluminum paints protective, colorful

**Uses:** As formulations for colored aluminum paints, aluminum-asphalt roof coatings.

**Features:** Development makes possible metallic protective finishes that will waterproof, insulate, decorate and preserve practically any type roof or metal surface.

**Description:** Basis for formulations for colored aluminum paints and aluminum-asphalt roof coatings is special aluminum pigment. Although blended with high-cost colors and other expensive ingredients, resulting product is competitive in price with other



## Pump acids through it...alkalis...then solvents It can't corrode because it's PYREX® pipe

**The pipe you can see through resists more corrosives than any other pipe, yet actually costs you less installed.**

Of all the chemicals you might run through PYREX Pipe, only hydrofluoric acid and hot, concentrated alkalis above pH 12 can corrode it.

Yet this pipe actually costs you less after all installation costs are considered, and it gives you the benefit of these other properties:

**You can see through it.** You can inspect the condition and cleanliness of this pipe visually. Should there be a blocking, you can locate it exactly, determine its nature, remove only the blocked section to clear the line.

**You can run liquids hot.** PYREX Pipe takes temperatures up to 450° F. For a 100° F. change in temperature a 100-foot section contracts or expands a mere 0.22 inches; so there's no chance of cracking or buckling when properly supported.

**No scale build-up.** Smoother by far than the most highly polished metal, the inner surface of PYREX Pipe usually eliminates scale build-up, often allowing the use of smaller diameters. Should scale develop, it's more easily cleaned off glass.

**Costs Less.** PYREX Pipe is itself competitively priced. Real savings begin when you start to install it. Because it's light, it goes up faster. Ten-foot sections of PYREX Pipe weigh less than the average four-foot sections of metal pipe.

You use only half the hangers, half the connections with the 10-foot lengths. You need no costly expansion joints.

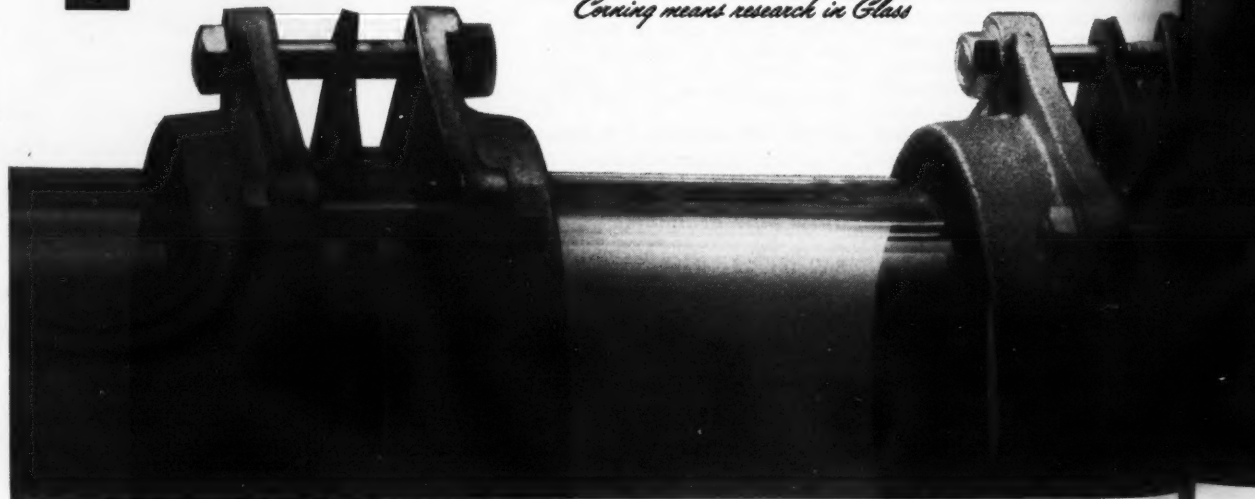
These savings continue in service, too, since replacement and repair of PYREX Pipe are practically nonexistent. Maintenance costs are incredibly low—one customer spends just \$6.32 annually to maintain 1600 feet of PYREX Pipe carrying brine.

**NEW BULLETIN.** We've just prepared a new bulletin on PYREX Pipe which lists properties, design features, installation advice, sizes, fittings, and other useful information. Write for a copy.



**CORNING GLASS WORKS 312 Crystal Street, Corning, New York**

*Corning means research in Glass*

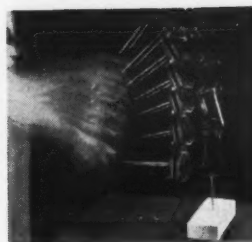


aluminum coatings and colored paints.

Colors now ready for production are copper, gold, blue, green, and brown. Colored asphalt product is suitable and desirable for waterproofing and decorating vertical walls of cement, concrete, stucco and cinder block. Easily applied with brush, squeegee or spray-gun, colored aluminum-asphalt coatings remain elastic, reflective, and resistant to chemical attacks in industrial areas. Line of alkyd-based colored aluminum paints are suitable for decoration and protection of tanks, structural steel, and metal buildings.

(Formulations for colored aluminum paints and aluminum-asphalt roof coatings were developed by Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.)

Check 2595 opposite last page.



**HAMMER-STRONG** You can actually hammer nails through wood with "Double-Tough" PYREX Glass Pipe. A new heat-strengthened process gives additional strength at the joints where it is needed most.

**EASY TO INSTALL** Your own plant men can install this lightweight pipe. Connections are simple, require no hot lead, take just minutes. All standard fittings available. Pipe comes in lengths up to ten feet.

#### **Water-jet exhausters usefulness extended to resist corrosion**

**Uses:** For performing vacuum-pumping operations or liquid- and gas-mixing operations in chemical, petroleum, and petrochemical plants.

**Features:** Units are available in variety of corrosion-resistant materials such as carbon lining, rubber lining, stainless steel, and Haveg.

**Description:** Multi-nozzle water-jet exhausters are designed to provide high vapor-handling capacities and low-operating water pressures. Water, under pressure, enters exhausters through pressure inlet and issues through nozzles into throat in converging streams. Corrosive vapors are drawn into exhausters, entrained by water, and discharged. If units can be installed at barometric height (34 ft in most locations) or can be provided with partial barometric legs, greater capacities can be obtained.

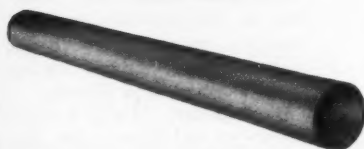
(Water-jet exhausters are product of Schutte and Koerting Co., Cornwells Heights, Bucks County, Pa.)

Check 2596 opposite last page.

Check 2594 opposite last page.

Only the  
Right piping  
can deliver a  
"GOOD RUN"

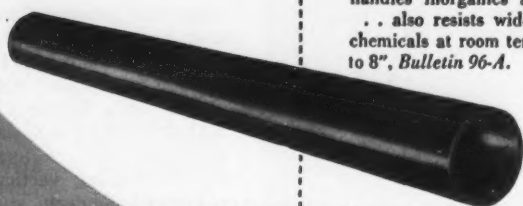
For profitable runs you must keep equipment "on stream" full time with no corrosion shut-downs. Protect your profits with Ace piping, pumps, valves, and tanks. Many rubber and plastic materials . . . backed by a century of chemical experience. Get facts today from American Hard Rubber Company.



**TOUGH ACE-ITE PLASTIC PIPE**  
General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe 1/2" to 6". Bulletin 80.

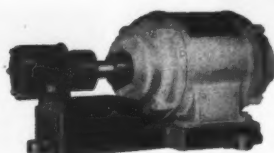
#### FOR HOT CORROSIVES:

**ACE TEMPRON**  
Heat-resistant nitrile hard rubber pipe handles inorganics at 250-275 deg. F. . . also resists wide range of organic chemicals at room temperature. Sizes 1" to 8", Bulletin 96-A.



#### MIGHTY MIDGET

for pumping acids



Jabsco neoprene-impeller pump made of Ace hard rubber outlasts, out-pumps anything in its pressure, size and price class. Capacity from 15 gpm. at 22 ft. head to 5 gpm. at 72 ft. head. Bulletin 97-A.

SENSITIVE,  
BUT KEEPS  
YOUR HEAD



#### ACE Darling Swing Check Valve . . .

lined with Ace hard rubber for the best in corrosion resistance. Large, straight-through flow areas. Sensitive to slight pressure differential. Non-slamming. Sizes 2" to 24". Bulletin CE-52.

**ACE** processing equipment of rubber and plastics

**AMERICAN HARD RUBBER COMPANY**  
DIVISION OF AMERACE CORPORATION  
Ace Road • Butler, New Jersey

Check 2597 opposite last page.

#### CORROSION

##### Giant corrosion-resistant pipe, duct system

Shown on their way to a large southern chemical plant, are huge elbows, tees, and transition sections fabricated from corrosion-resistant polyester resin reinforced with glass fiber. According to man-



ufacturer, the shipment is the largest pipe and duct system yet fabricated of this material. System consists of 22 pieces, varying in diameter from 36 to 50", forming a combined length of 460'.

Pipe and ducts will be used for saturated 12% SO<sub>2</sub> condensed from gas 7-10% H<sub>2</sub>SO<sub>4</sub> at 110°F and minus 24" WG pressure.

(Bonate pipe and duct system was fabricated by Carl N. Beetle Plastics Corp., 145 Globe St., Fall River, Mass.)

Check 2598 opposite last page.

##### Add to service life of pipe with versatile coatings of nickel alloy

Many ferrous materials can be corrosion protected

**Uses:** For providing protection against corrosion in chemical pipe systems, pressure tube used in heaters, heat transfer equipment, and other chemical processing units.

**Features:** Even a 180° bend in pipe will not cause peeling or flaking of coating. Scaling of base metal at temperatures up to 1150°F is effectively prevented.

When properly welded, coated areas suffer no loss of corrosion resistance in weld-affected area.

**Description:** Nickel alloy cladding is composed of nickel oxide and dibasic ammonium

for **PUMPING  
CHEMICAL  
SOLUTIONS!**

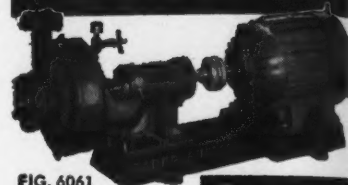


FIG. 6061

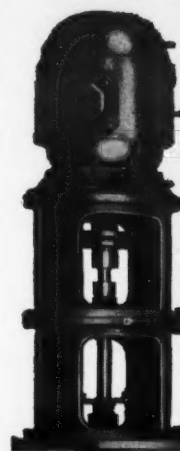


Fig. 19,488

Write for  
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C-355  
for  
**HORIZONTAL  
PUMPS**  
...  
for  
**VERTICAL  
PUMPS**  
V-837

**TABER PUMPS ARE**  
specially built for handling chemical solutions, efficiently and economically . . . in the processing industries. The Vertical design permits locating stuffing box above and out of liquid level. Therefore nothing to leak.

**BULLETINS**  
as above gladly sent on request.

**TABER PUMP CO.**  
Est. 1859  
320 ELM ST.  
BUFFALO 3, N.Y.

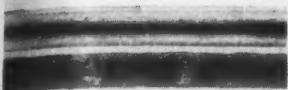
**TABER**

Check 2599 opposite last page.

CHEMICAL PROCESSING



## CORROSION



Nickel alloy coatings build extra corrosion protection into chemical plant pipe and tube

treated requires no special finishing other than usual clean facing required for application in bonding under heat treatment. Thicknesses are approximately 0.001" on average coatings, but cladding up to 0.025" can be obtained in one application. Method of application can range from painting, spraying, or dipping, depending on circumstances of shape, weight, and size.

(More information on application possibilities of "Niphos" nickel alloy coatings can be obtained from Tube Reducing Corp., Wallington, N. J.)

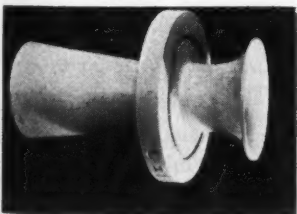
Check 2600 opposite last page.

### Meters corrosive fluids with $\pm 1\%$ accuracy

**Uses:** For metering corrosive fluids.

**Features:** Unit has uncalibrated accuracy within  $\pm 1\%$  of actual rate of flow, and wide pH range.

**Description:** Insert type venturi flow nozzle is fabricated



Plastic venturi flow nozzle meters corrosive fluids with accuracy within  $\pm 1\%$

of glass-fiber reinforced polyester plastic. Nozzle comes in line sizes ranging from 2 to 24 inches. It is suitable for pressures up to 150 psig and temperatures up to 250°F on most applications.

(Venturi Flow Nozzle is product of Builders-Providence, Inc., 345 Harris Ave., Providence 1, Rhode Island.)

Check 2601 opposite last page.



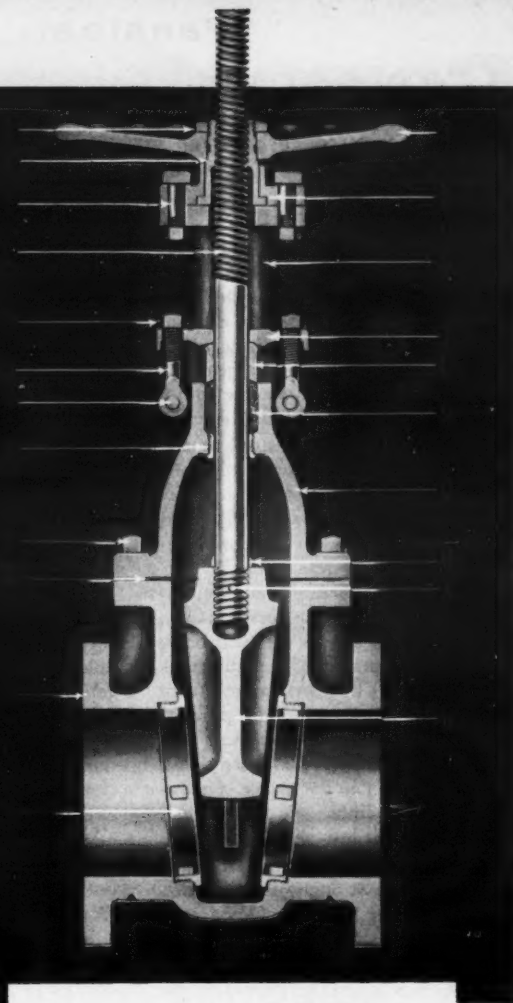
## NI-RESIST

Wherever valves are attacked by acids, salt and alkaline solutions, sea water, brine or other corrosive fluids, vapors or gases, "Jenkins Ni-Resist Gate Valves" are fighting words.

In a wide range of corrosive and erosive services common to the chemical, food, plastics, marine, petroleum, and pulp and paper industries, these valves have shown a remarkable ability to withstand corrosion and cut valve costs.

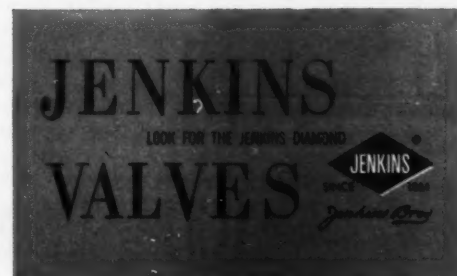
The secret of their long, trouble-free service is the combination of Ni-Resist type 2 cast iron and type 316 stainless steel trim, plus Jenkins *extra value* construction throughout. No other gate valves offer this combination for fighting corrosion.

When choosing Ni-Resist valves, let the famous Jenkins Diamond be your guide. Specify "JENKINS NI-RESIST" — for longer valve life. Write us, or ask your Jenkins Distributor for information folder No. 205. Jenkins Bros., 100 Park Avenue, New York 17.



- A Bronze yoke bushing nut
- B Handy grip iron wheel
- C Bronze yoke bushing
- D Iron yoke cap with zerk fitting for lubricating bushing
- E Steel yoke cap bolts and nuts
- F TYPE 316 STAINLESS STEEL spindle
- G NI-RESIST CAST IRON, TYPE 2, yoke
- H Bronze eye bolt nuts
- I Malleable iron gland flange
- J Steel gland eye bolts
- K Steel gland lug bolts and nuts
- L TYPE 316 STAINLESS STEEL gland

- M Teflon impregnated asbestos packing
- N TYPE 316 STAINLESS STEEL bonnet bushing
- O NI-RESIST CAST IRON, TYPE 2, bonnet
- P Steel bonnet bolts and nuts
- Q TYPE 316 STAINLESS STEEL spindle ring
- R Asbestos gasket
- S TYPE 316 STAINLESS STEEL wedge pin
- T NI-RESIST CAST IRON, TYPE 2, through-port body
- U TYPE 316 STAINLESS STEEL solid I-beam wedge
- V TYPE 316 STAINLESS STEEL seat rings



Sold Through Leading Distributors Everywhere

Check 2602 opposite last page.

# Fansteel Corrosionomics

REGISTERED U. S. PATENT OFFICE  
A JOURNAL OF USEFUL INFORMATION FOR THE SOLUTION OF CORROSION PROBLEMS

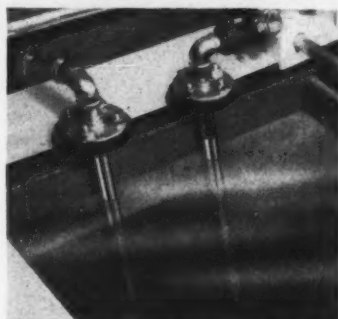
## TANTALUM INERT TO ACID PLATING BATHS

The inertness of tantalum to a broad spectrum of acids and oxidizing agents has resulted in increasing usage of this metal for heating and cooling equipment in acid electroplating systems.

Plating baths are heated, usually with steam, at start-up and subsequently must be cooled in most cases during continuous operation. The heat generated by the electric power not consumed in the actual deposition of metal usually is greater than the heat lost by radiation, evaporation, etc., and that used to heat the parts being plated. Coils placed in the plating tank and external heat exchangers through which the process solution is pumped are the chief types of heating and cooling equipment used. Corrosion is a major factor in the choice of materials for such units.

U-coils and tube and shell heat exchangers made of tantalum are widely applied in the strongly oxidizing chromium plating baths, composed of 33 to 53 ounces per gallon of chromic acid,  $\text{CrO}_3$ , in dilute  $\text{H}_2\text{SO}_4$  at a  $\text{CrO}_3/\text{H}_2\text{SO}_4$  ratio of 100/1. They are used with both steam and water to regulate the temperature at the desired value in the range 110°-150°F.

The temperature of the acidic nickel plating baths, containing nickel sulfate and/or nickel chloride at pH's of 0.9-4.8, is controlled similarly with tantalum heating and cooling units. Acid zinc bath temperature regulation



Installation of "U" type tantalum heaters with insulating hoses of non-conducting materials in piping.

Courtesy Metal & Thermil Corporation

likewise can be handled with tantalum equipment. In zinc baths using insoluble anodes the presence of free oxygen discharged at the anode has no effect on tantalum.

Most electropolishing is done in solutions containing a variety of acids, including perchloric, acetic, phosphoric, chromic and mixtures of these and others. With the exception of those containing HF or free  $\text{SO}_3$ , tantalum is inert to all such solutions over the temperature range used, 110° to 250°F.

In addition to its inertness to acidic solutions, tantalum has several other advantages. Thin wall tubing can be used in the heating and cooling units since no extra thickness need be provided for corrosion loss, no heat-insulating corrosion scale forms on tantalum, no contamination of the plating bath by tantalum is encountered, and space requirements are minimum.

### Free Tantalum Test Kit

A corrosion test kit, available without charge to research technicians, contains both tantalum sheet and wire. Request it on your letterhead.

The above condensation is typical of articles which appear in CORROSIONOMICS, a Fansteel publication. Mail us your name for inclusion on our mailing list.



Typical Acidic Plating Baths			
TYPE	REAGENTS*	pH	TEMP.
Chromium	$\text{CrO}_3$ , $\text{H}_2\text{SO}_4$	< 1	110°-150°F.
Nickel	$\text{NiCl}_2$ , $\text{NiSO}_4$ , $\text{HBO}_3$	1-4	90°-160°F.
Zinc	$\text{H}_2\text{SO}_4$ , $\text{ZnSO}_4$	1-4	80°F.
Copper	$\text{H}_2\text{SO}_4$ , $\text{CuSO}_4$	< 1	70°-120°F.

\*Tantalum inert to these reagents



For further data on the above, write:

**FANSTEEL METALLURGICAL CORPORATION**  
CHEMICAL EQUIPMENT DIVISION

NORTH CHICAGO, ILLINOIS, U. S. A.

G576A

Check 2603 opposite last page.



About \$350,000 worth of nickel and nickel-clad tanks were furnished for Hooker Chemical's new \$12-million chlorine-caustic plant at North Vancouver, B. C., Canada. Extreme care during layout and setup, along with special welding procedures during fabrication, . . .

## prevents vessel failure from caustic embrittlement

**Problem:** Steel is frequently exposed to caustic liquors due to lack of care during layout, setup, and welding in the fabrication of nickel and nickel-clad equipment for handling caustic. This results in leakage and an occasional loss of a vessel due to caustic embrittlement. Fabrication of nickel and nickel-clad equipment is very special and requires skilled men and great care. Only a small percentage of fabricating shops in the country are qualified to do this work.

**Solution:** Exact care and special welding procedures were followed in the fabrication of a number of tanks and vessels for the new Hooker Chemicals Limited, chlorine-caustic plant at North Vancouver, B.C.

Plant, which went on stream in October 1957, is the first chlor-alkali plant in Canada west of the Rockies. It has a

daily production of 100 tons of chlorine, 110 tons of caustic soda, and a million cubic feet of hydrogen.

### Nickel-clad Steel Caustic Tank

Possibly the most interesting vessel on the entire project is a caustic holding tank 17' in diameter x 29'6" high. This was fabricated from nickel-clad steel. Normally a vessel of this size would be field-erected, as the diameter exceeds any normal rail or highway clearance. It was felt, however, that the matter of assuring the integrity of the cladding was of utmost importance. It was thought that the best results could be obtained by shop-fabricating so that all of the welding on the armor side of the plate could be done in a downhand position. This was done. The completed vessel was shipped a



Large nickel-clad caustic storage tank prior to shipment to the new Hooker plant in Canada

short distance by rail, and then by barge, to the plant at Vancouver.

Quite obviously, nickel-clad steel was used due to the inherent resistance of pure nickel to hot caustic solutions. A chain being no stronger than its weakest link, it was considered of extreme importance that the nickel weld bead on the inside of the tanks be as free from iron as possible. It was established that the deposited weld-metal should not contain more than 6% of iron. The fabricators elected to use inert-gas-shielded consumable-electrode method of welding. Great care was taken to chip out the joint on the inside of the tanks, and a minimum of two separate passes were made from the nickel side. Chemical analyses were taken of the deposited weld. In no case did they show over 5.5% iron, and in most cases as low as 3.5%.

#### Solid Nickel Evaporator Body

The fabrication of the evaporative equipment presented some rather interesting challenges due to the variety of materials involved. As an example, the first-effect vapor body was 10'6" diam x 21' cylindrical height, and the shell was of 5/16" thick solid nickel. This was reinforced with mild-steel stiffener angles on the outside. As a result, a

certain specified procedure had to be followed in the welding of the solid nickel shell and an entirely different procedure set up for the welding of the mild-steel stiffeners to the solid nickel evaporator body.

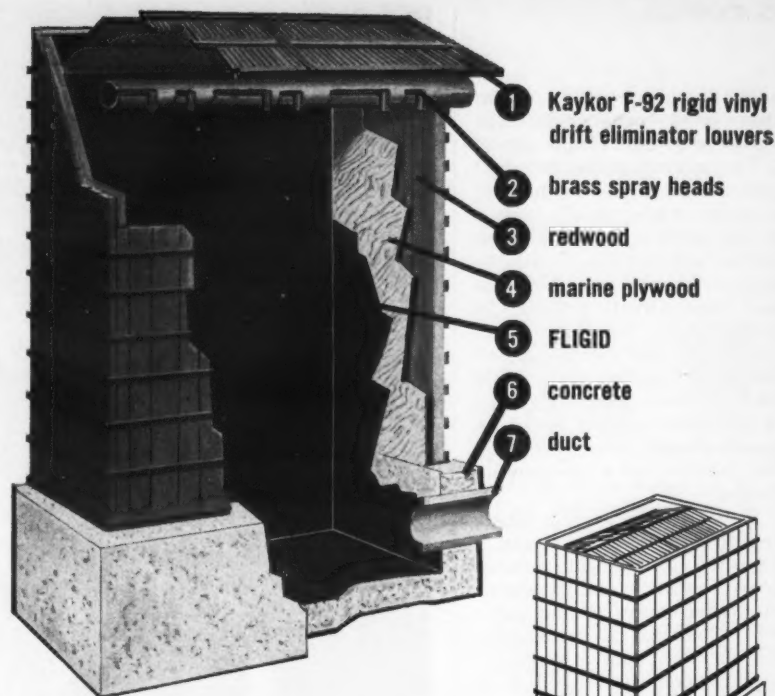
The second- and third-effect vapor bodies were of the same general size, but they were made from 1/2" thick 20% nickel-clad steel plate. The indicated procedure for properly welding the nickel-clad shell seams was entirely different from the corresponding procedure required for welding the solid nickel.

The salt receiver tanks and the salt separator tanks were all fabricated from solid nickel plate. This material varied from 3/16 to 1/4" in thickness, but there were various internals which were made from #14- and #16-gage nickel sheet. The equipment also included a 54" diam x 12' cylindrical-height barometric condenser which was fabricated from 3/16" thick solid Monel. Here again, another metal was brought into the project with the attendant necessity of still another welding procedure.

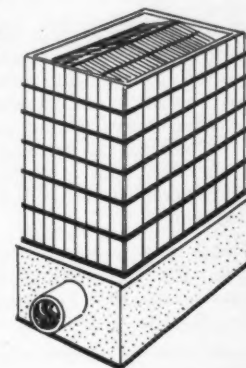
There were also three cylindrical coolers involved. These were 9' diam x 10'1" cylindrical height and were made with a shell of 1/2", 20% nickel-clad steel. On the inside of these coolers, were cooling coils of the helical-type made from 3" diam, #15-gage Monel tubing. It was obviously necessary to weld these sections of tubing together in order to make the complete coil, and it was decided to use the manual Heliarc to make these butt welds, purging the inside of the coil



Another group of nickel-clad vessels ready for shipment to Hooker



Spray type, forced draft counter flow, high temperature cooling and deaerating tower supplying high purity process water. Inside dimensions are 16' x 12' x 29'6". Lined with Kaykor Fligid by Wyatt's Plastics, Inc., Div. of Wyatt Metal & Boiler Works, Inc., Houston, Texas.



## line cooling towers with FLIGID® to eliminate corrosion

While wood is the traditional material for cooling towers, corrosive process water—or chlorine compounds admixed during cooling—often make it a very expensive choice. Engineers faced with this problem at the Gulf Coast plant of a major processor solved it by taking a tip from the process vessels in the plant . . . and called for vinyl linings.

They learned that flexible linings like Kaykor L-10 could easily be applied, but wouldn't resist the calcium hypochlorite used to "bleach" the process water. And while rigid vinyl like Kaykor F-92 did resist the hypochlorite, it couldn't be efficiently applied to the tower walls.

As a result, the entire interior was lined with Kaykor Fligid . . . an amazing laminated lining material which has one L-10 face and one F-92 face. A standard Kaykor cement system makes it easy to apply the L-10 face to both the concrete foundation and the marine plywood lined redwood walls. And the exposed face of unplasticized F-92 provides the ultimate in lining strength and corrosion resistance.

Chances are one or all of these materials can solve your corrosion problems, whether they involve cooling towers or any other kind of process equipment. A vast network of qualified applicators and fabricators across the U. S. and Canada give fast and experienced service in the field or in the shop. If you'd like further technical information, we'll be happy to provide you with our General Bulletin 1000 on request.

**K**® **KAYKOR INDUSTRIES, INC.**  
Division of Kaye-Tex Manufacturing Corp.  
4401 Broad St. • Yardville, New Jersey

Check 2604 opposite last page.



## CORROSION

with argon to make certain that 100% penetration was achieved at each of the joints.

The inert-gas-shielded consumable-electrode method of welding, while ideally suited to the girth and longitudinal seams, was not readily adaptable to the attachment of coils and other small fittings. In such cases, the fabricators elected to use the inert-gas-shielded tungsten arc. While welding was considerably slower, the welding could be more closely controlled and the results were comparable quality-wise.

**Results:** Care used in fabrication of vessels and tanks is expected to prevent failures from caustic embrittlement and other causes. A long period of service is anticipated before more than a minimum of maintenance is needed on equipment.

(Vessels and tanks were fabricated by Puget Sound Fabricators, Inc., 3670 E. Marginal Way, Seattle 4, Wash.)

Check 2606 opposite last page.

### **Develop all-plastic valve that combines features of gate, globe types**

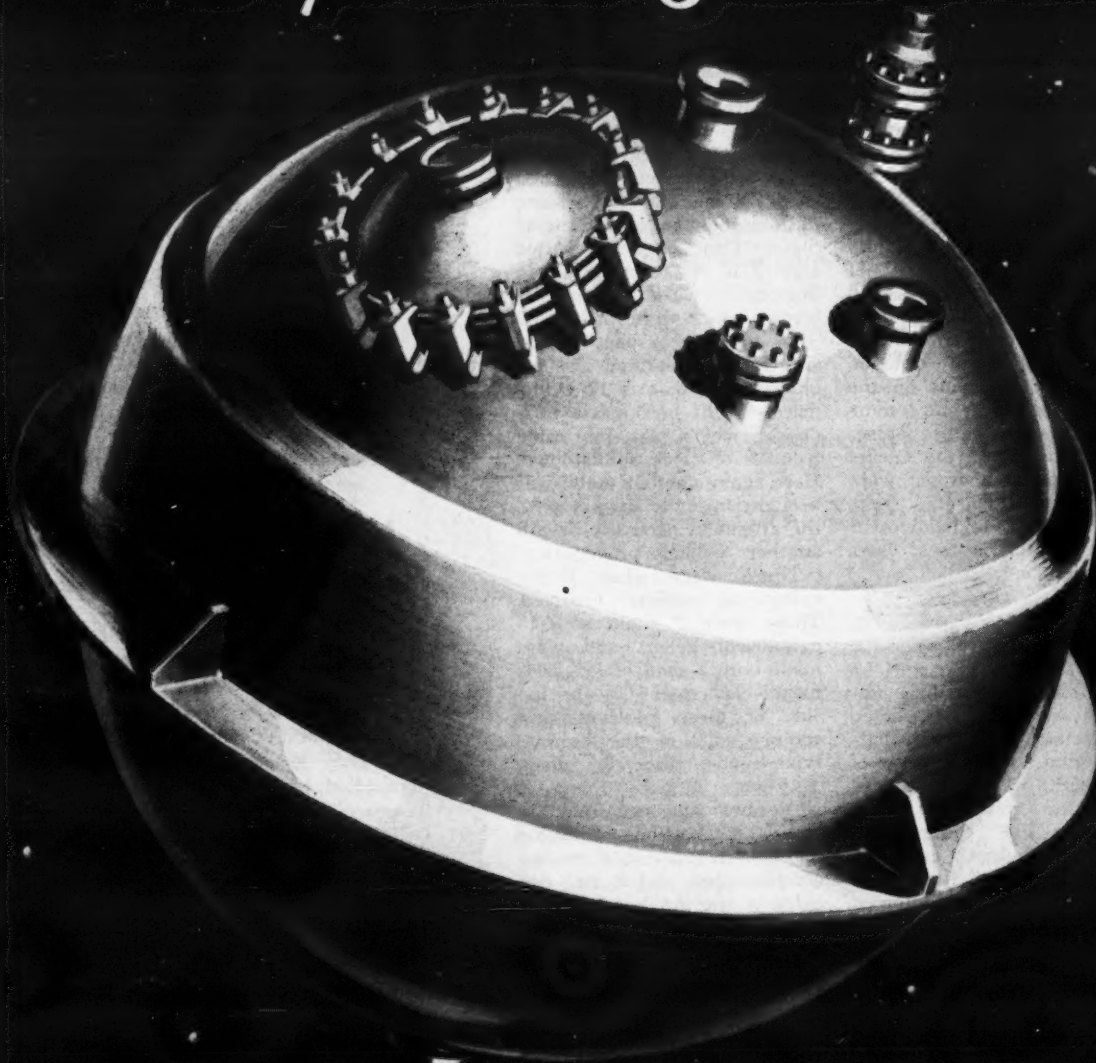
**Uses:** For conveying corrosive and abrasive liquids in lines that cannot be chemically contaminated.

**Features:** When valve is completely open there are no obstructions. Non-pressure-drop characteristics of gate valve are combined with throttling abilities of globe valve when unit is in closed position. Resilient synthetic cap can be removed quickly and replaced easily without removing valve from line. Shut-down time is reduced to minimum and maintenance costs cut drastically.

**Description:** All-plastic gate valve is available in both PVC (rigid polyvinyl chloride) and styrene-copolymer. It operates by the closure of conically shaped plug with resilient, easily removable, synthetic cap on inside of body. When fully open, there is no obstruction to fluid flow. When partially open, the developed

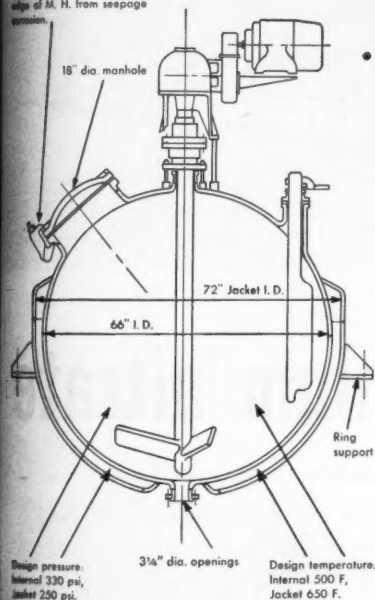
**TOMORROW'S ENGINEERING TODAY!**

*the spherical glass-lined re*



reactor is here!

Hurdley "C" retainer ring — retains GRT and protects outer edge of M. H. from seepage around.



## Designed to operate at internal pressures in excess of 300 psi

### A Glascote first!

No longer need processing be limited to 200 psi! This is the kind of process engineering you'd expect from Glascote. The 500-gallon (nom. capacity) reactor shown is designed to operate at 330 psi internal pressure and 250 psi in the jacket.

- Large capacity — sphere shape permits thinnest metal wall possible to contain a given amount of liquid under pressure.
- Shorter agitator shaft — reduces drive maintenance, shaft bending normally encountered in large volumes.
- One main seam — minimum of welding. Full X-ray quality. Ring-type support.
- Higher vaporization rates — less foaming, due to larger liquid surface area.
- Higher pressures — both internal and external for larger units.

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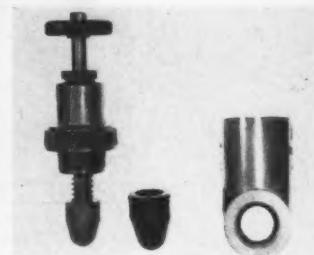
A SUBSIDIARY OF A. O. Smith CORPORATION

World's largest manufacturer of glass-protected steel products

Check 2607 opposite last page.

## CORROSION

curved design of the flexible cap and plug allows for minimum turbulence with throttled controlled flow.



Unique design feature of all-plastic gate valve provides for quick removal and replacement of cap without removing valve from the line

Flexible cap is available in either Buna N, neoprene, or Hypalon, with Kel F elastomer for special applications. PVC line resists temperature up to 140°F; styrene-copolymer up to 170°F. Valve has back-seating feature created by pressure exerted by seating of flexible cap on bottom face of bonnet when valve is fully open, thus relieving pressure of packing. Rated working pressure of valve is 200 lb.

Valve performs well under vacuum service. Research and field tests conducted by manufacturer show that seating with resilient surface against rigid plastic materials will hold vacuum more efficiently than metal-to-metal seal.

("Flex-Plug" all-plastic gate valve is product of Vanton Pump & Equipment Corp., Div. of Cooper Alloy Corp., 201 Sweetland Ave., Hillside, New Jersey.)

Check 2608 opposite last page.

### Remedies corrosion

Documented case histories of manufacturer's thermoplastics as chemically inert replacement for metal, rubber and other anti-corrosion materials highlight 19-page bulletin. "Argo-170 Polyethylene" — Argo Plastic Products Co., 1095 Brookpark Rd., Cleveland 9, Ohio.

Check 2609 opposite last page.

See a full-scale working model of the new Spherical Reactor, at the 26th Exposition of Chemical Industries, December 2-6, 1957, Booth No. 596, New Coliseum, New York.



## 2,000,000-gallon ammonium nitrate ta

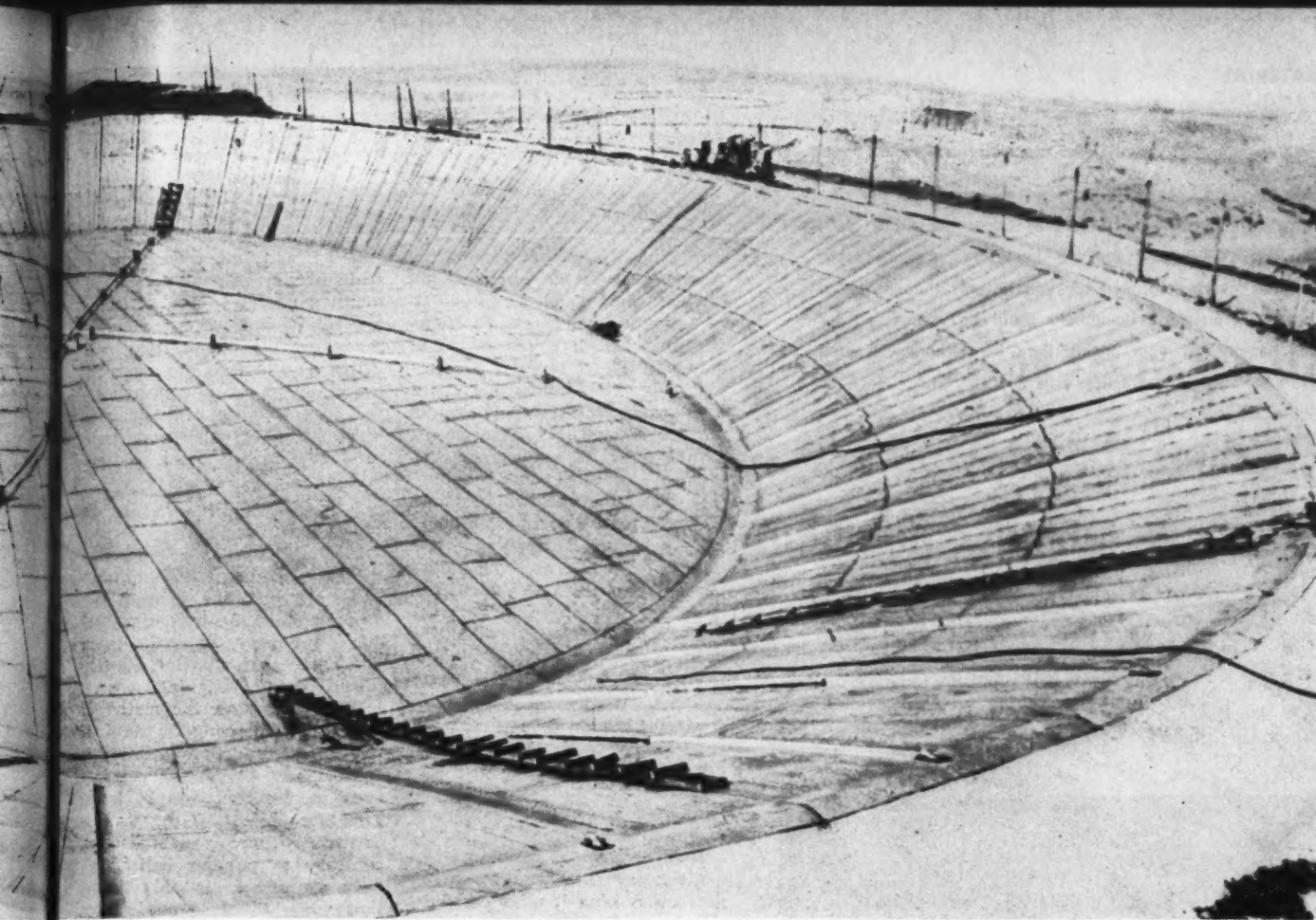
Notice expansion joints around edge of tank, which looks like a small football stadium. Workmen are getting ready to weld.



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Tank is 200 feet in diameter at the top, 150 feet at bottom. It's 15 feet deep, holds 2,000,000 gallons of ammonium nitrate.

## te tank lined with USS Stainless Steel

Hercules Powder Company needed an ammonium nitrate storage tank, so they used a two-million-gallon concrete reservoir that had been unused since World War I. The tank is located near the city of Richmond, California.

The tank was cleaned and lined with 124,000 pounds of 14-gage USS Stainless Steel, Type 304. Sixty rib-like expansion joints were pressed into the Stainless Steel, and the fabricated steel was welded at the job site by field crews of U. S. Steel's Consoli-

dated Western Division.

Three and one-half miles of lap seams were welded, and every inch was vacuum-tested. And, in more than 18,000 feet of welds, only two tiny imperfections were discovered.

In chemical plants, the imaginative use of corrosion-resistant Stainless Steel can result in tremendous cost savings. To be sure of service-tested quality, make it *USS* Stainless Steel. It's in stock at your nearest warehouse.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

# USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS



UNITED STATES STEEL

For more information on product at left, specify 2610 see information request blank opposite last page.

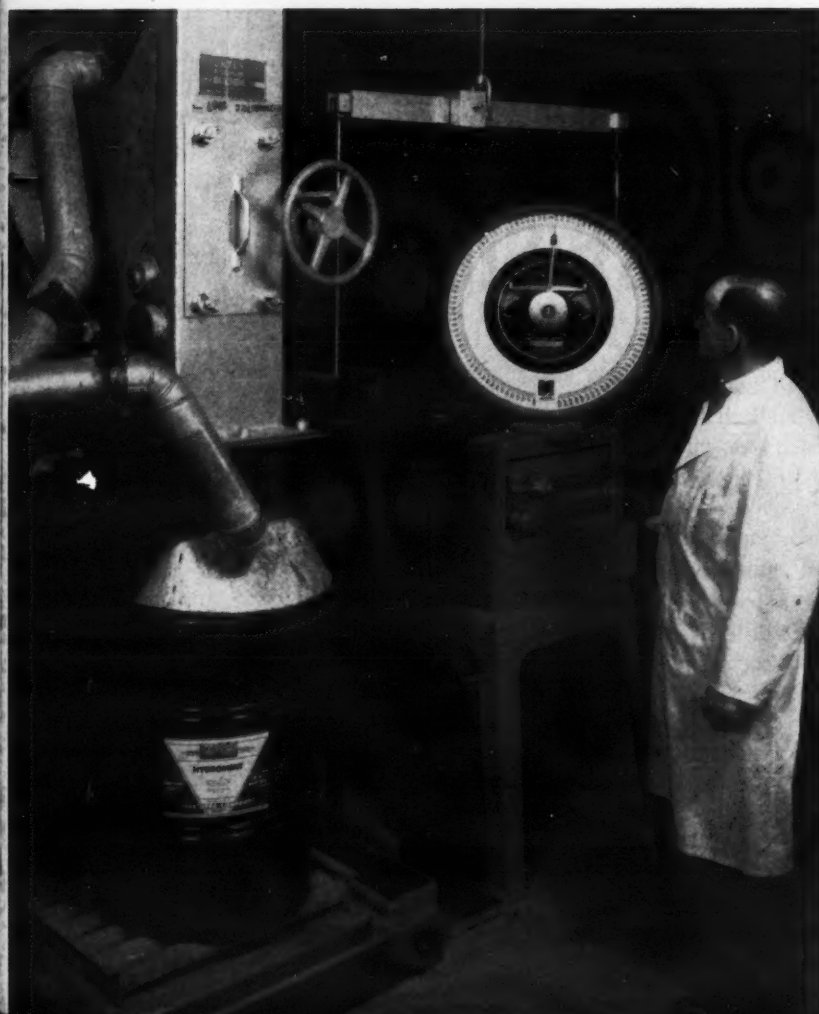




In this day and age, when chemical manufacturers are consistently faced with the problem of combating rising costs, management is turning an eye toward cost-cutting areas often-times overlooked. Perhaps you haven't thought about it, but your weighing equipment could be responsible for cutting heavily into your profits. Here, an authority on good weighing practices tells how to . . .

## get the most from your weighing equipment

**ARTHUR SANDERS**, Executive Secretary  
Scale Manufacturers Association, Inc.  
Washington, D. C.



**M**R. W. J. SCARBOROUGH of Du Pont's Engineering Department recently remarked in a talk before the Scale Manufacturers Association, "In the chemical industry, weight is as basic a measurement as pressure, temperature and flow. In order to control product quality, production rate, yield, operating costs, and insure safety of personnel and equipment, these measurements must be made and they must be accurate and reliable."

Not many people would quarrel with that. Accurate weighing is important all along the line in the chemical processing industry — from the delivery of the materials — through all the processing steps — to when the product is packaged and shipped from the plant.

Really, when you look at it, weighing is a basic step at every stage of the operation. Scales are vital in the chemical industry in at least these six areas — and, of course, these are by no means all-inclusive:

1. In checking receipts and making sure that your company gets everything it pays for.
2. In cost accounting.
3. In batch proportioning, for quality control.
4. For profit control. This is an area often overlooked, but in a highly competitive industry like chemicals, it should be pointed out that a "giveaway" of expensive materials in batching or through inadvertent overweight of packaged products can open up an unsuspected and expensive profit leak.
5. In packaging material for market.
6. In shipping costs.

At each of these points along the line, there is an opportunity for problem-making weighing errors.

### Become 'Scale Conscious'

Perhaps the best place to start improvement of your weighing operations is to become "scale conscious", and to see that your subordinates do also. We are all guilty of taking scales too much for granted, forgetting that they have a very tough job to do and need reasonable care. After all, a scale is a precision instrument, often built to the tolerance of a

fine watch. Tolerances of one-tenth-thousandths of an inch for critical parts are not uncommon.

If he will but realize that a scale needs reasonable care and maintenance, a plant executive has gone a long way in preventing expensive "down-time," and in preventing weighing mistakes, especially in the important matter of protecting profit margins through not giving away more product than he's being paid for.

### Scales Can Be Wrong

If you start with the realization that a scale can make mistakes and be wrong, the same as any other machine — even if it balances out nicely at zero — then you have taken the first big step toward better weighing.

Incidentally, on the matter of the scale balancing at zero: It should be noted that scale errors can often be in varying percentages at different weight loads. The mere fact that the scale is correct at zero weight is not, contrary to popular belief, unduly significant. It only means that when there is no load on the device, it is correct. Since you don't weigh anything at zero weight, the zero test is far from assuring.

Proper maintenance and regular tests are the correct and reliable ways to be assured of a scale's accuracy. Given reasonable care, today's modern scale is one of industry's most accurate and reliable instruments. But you should be aware that your scale is not infallible. This warning seems especially appropriate in the chemical processing industry, where weighing conditions are especially difficult and where many old "klunkers" — antiquated scales — seem to have been in use almost from the "Year One" with no test of their accuracy and little or no care.

In a single article, it would obviously be impossible to cover adequately all phases of weighing in such a vast industry as chemical processing. Perhaps it would be most helpful if I concentrated, instead, on discussing some aspects of weighing which are often overlooked.

One of these is the relationship of accurate weighing to profits. This should be perfectly

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obvious, but the experience of experts such as the commercially disinterested National Conference on Weights and Measures, which meets annually in Washington under the leadership of the National Bureau of Standards, indicates that it isn't.

In common with all other industries which sell in commerce, chemical processors are required by weights-and-measures laws to give full net weight on all packaged or other goods purveyed. As a matter of good business ethics, of course, you will be the first to agree that this should be so. However, the customer is not entitled to more than he pays for. And here is where neglect of scales and small weighing errors can become very expensive.

#### Pennies Add Up

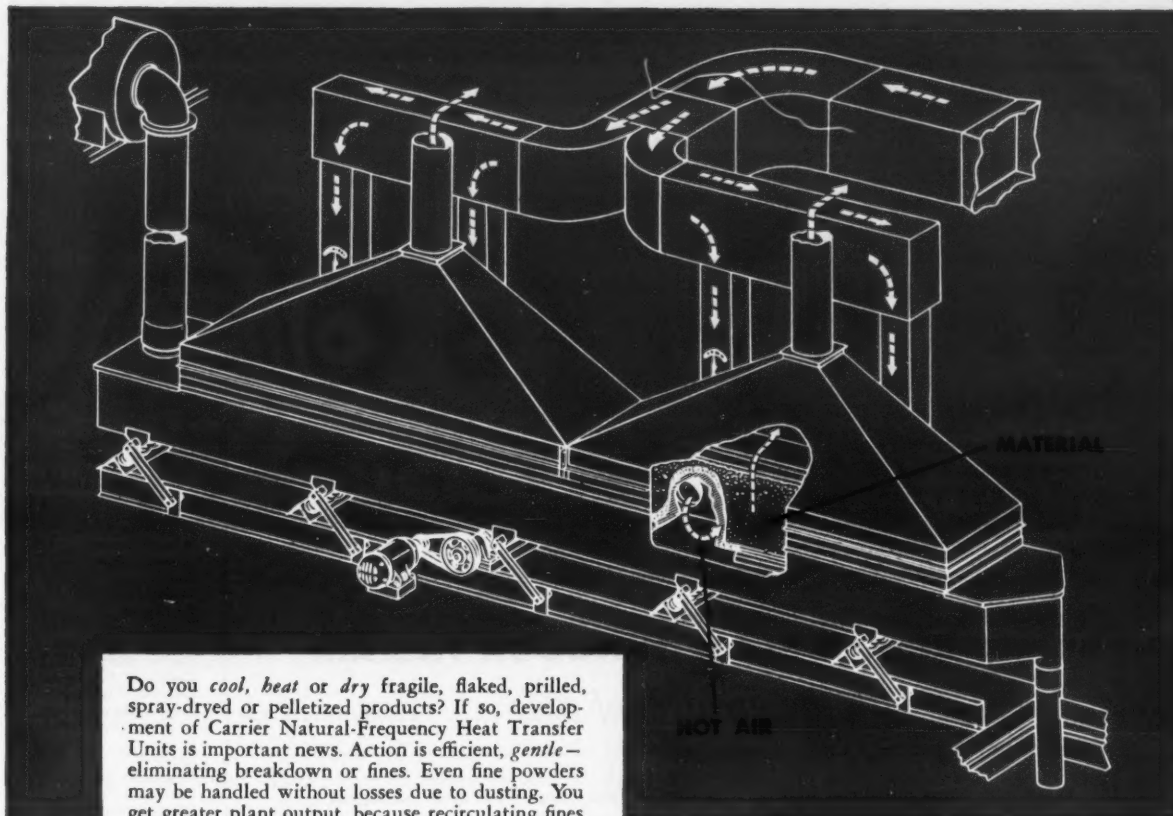
A couple of years back, one of the nation's most respected engineers, Fred Blummers, Chief Methods Engineer of General Mills, Inc., spoke on the subject of weighing errors. Pointing out that the company policy and the provisions of weights-and-measures laws require the filling of all packages to the point where the customer receives full net weight, Mr. Blummers noted that inadvertent overweight can be extremely costly.

If, for instance, one of the scales on his company's pre-packaging lines were to allow one-eighth ounce overweight on each eight-ounce package of breakfast food, the loss of materials would amount to \$100,000 a year on that line alone. (Why not stop here and figure what an eighth-ounce error would cost per year?)

There is another side of the coin, too. Where materials are bought and sold in commerce, laws in virtually every state require that full net weight be given. To do anything less is dishonest, no matter how well-intentioned the manufacturer may be. The penalties for giving short weight, both official and unofficial, may be tremendous. A company publicly branded, and often

Now! You can cool, heat, dry fragile materials  
—with no product breakdown...

## CARRIER heat transfer units



Do you cool, heat or dry fragile, flaked, prilled, spray-dried or pelletized products? If so, development of Carrier Natural-Frequency Heat Transfer Units is important news. Action is efficient, gentle—eliminating breakdown or fines. Even fine powders may be handled without losses due to dusting. You get greater plant output, because recirculating fines is a thing of the past.

And look at these other advantages! Carrier heat transfer equipment can screen and separate the material being handled while cooling, heating or drying. Units which sample continuously while accomplishing heat transfer can also be provided. Drying air may be varied according to temperature, taking advantage of constant and falling rate drying periods. In addition, there is a high degree of uniformity in the finished product.

Carrier offers all these advantages plus such other important features as ease of clean-out; self-cleaning action which prevents contamination between batches; savings on plant equipment headroom because inclined and vertical units can elevate while processing, and a long retention time with start-stop operation.

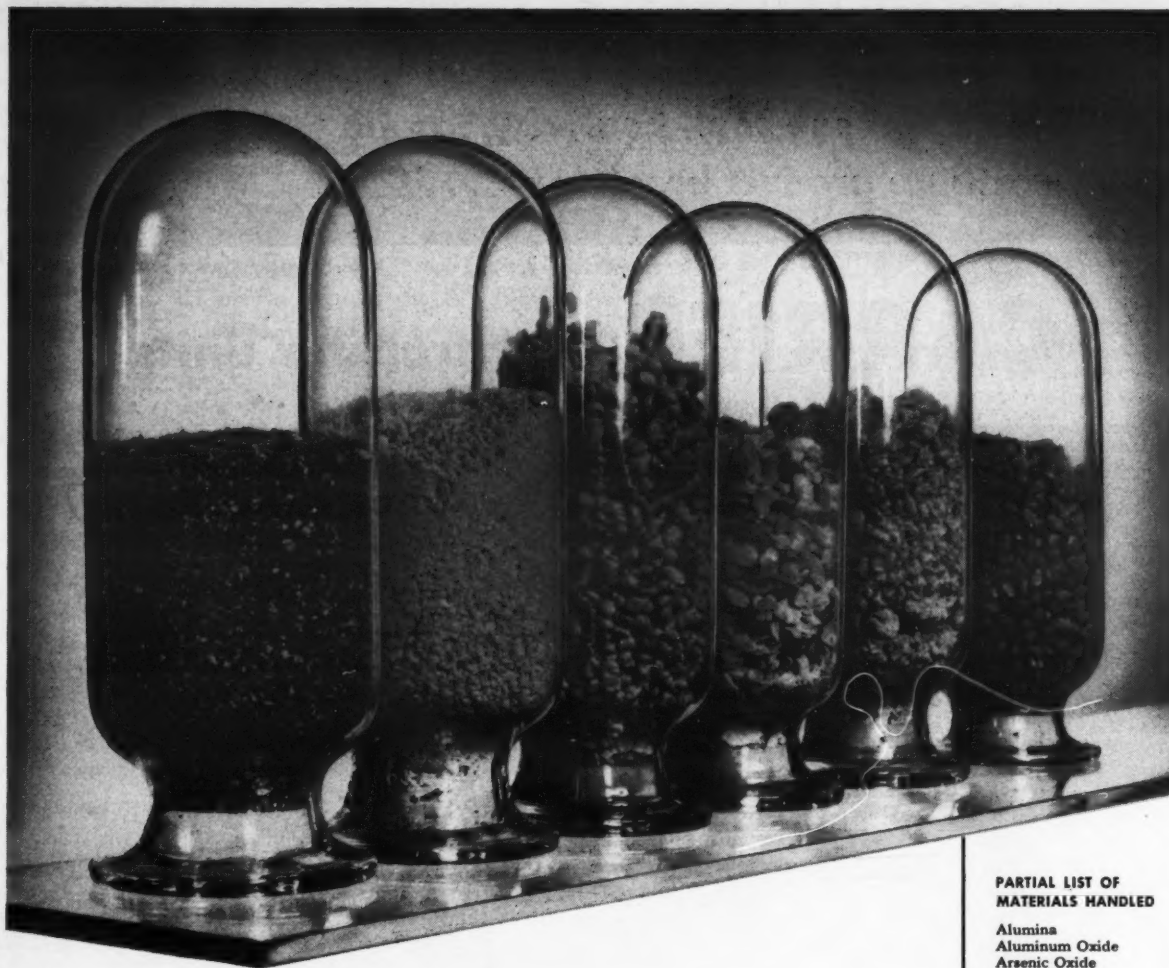
Get all the facts now. Write today for full information. Carrier Conveyor Corporation, 206-A North Jackson Street, Louisville, Kentucky.

Carrier Natural-Frequency Heat Transfer equipment slowly conveys the material being handled across a screen, with the heat transfer media being drawn through the screen and material by an induced draft fan—or forced through the screen and material by a forced draft fan as shown. A stationary or vibrating hood is included to exhaust the air after use.

## CARRIER NATURAL-FREQUENCY CONVEYORS

Check 2611 opposite last page.





## THESE MATERIALS FLOW THROUGH THE AIR

*...with the greatest of ease*

Today, more and more industrial plants are turning to Fuller to solve their problems in handling a wide range of dry bulk materials. Fuller pneumatic conveying systems have gained such wide acceptance within industry because Fuller has engineered its equipment for "automated" operation.

When you have a Fuller system, you can save thousands of dollars by buying in bulk rather than in bags. There is no

waste in handling. The most stringent sanitation requirements can be met.

Efficient, peak production is assured and at far lower operating costs than many other types of conveying systems, and your maintenance problems are at the minimum. Why not write to Fuller Company today—we'll be glad to send you descriptive literature showing you how Fuller solves many different problems in many types of plants.

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pioneers in harnessing AIR



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G-151  
3756

Check 2612 opposite last page.

### PARTIAL LIST OF MATERIALS HANDLED

Alumina  
Aluminum Oxide  
Arsenic Oxide  
Asbestos Dust  
Barite  
Bauxite  
Bentonite  
Borax  
Calcium Carbonate  
Carbon Black  
Catalysts, Petroleum  
Cement, Portland  
Cement Raw  
Material  
Chalk  
Clays  
Coal, pulverized  
Detergent Powders  
Diatomaceous Earth  
Feeds, soft  
Fertilizers  
Flour  
Flue Dusts  
Fly Ash  
Gypsum  
(raw or calcined)  
Lime, pulverized  
Malt  
Ores, pulverized  
Phosphate Rock,  
pulverized  
Resins, synthetic  
Salt  
Silica, pulverized  
Starches  
Sugars, refined  
Talc

## MATERIAL HANDLING

caught as cheating its customers, would be given a black eye that would cancel out decades of honest dealing and large amounts spent in advertising and promotion. In addition, it may be necessary to repackage an entire batch of material before offering it for sale. This is a very costly operation and can be disastrous to profits.

### Chemical Plant Conditions Present Difficulties

The whole problem is complicated by the fact that weighing conditions in chemical processing plants are difficult — often in the extreme. Corrosion, dust, dirt, extremes in temperature or moisture — these are common. It simply means that, to get the most out of your weighing equipment, you're going to have to exercise more care than industry in general. You can neglect your weighing equipment at your peril.

What causes scale mistakes? As I said before, scales, even though they are ruggedly built, are precision instruments. Most scales, even the gigantic weighing machines used to weigh tank-car loads, are built to an astonishing degree of precision.

This means that rough treatment, dropping loads on a scale, or the attempted repair or adjustment of scales by untrained personnel, can cause sensitive mechanisms to get out of alignment.

Friction is another cause of weighing mistakes. The most common cause of friction is simply the wearing out of the parts from heavy usage. When scale parts are new, they are keen and hard, and move easily against each other. With hundreds of thousands of weighings, the parts become dull and build up resistance to movement. This usually means that more weight is on the platform than is indicated on the scale. Frequent, regular tests are the only way you can tell whether your scales are correct or not. These tests are inexpensive and pay big dividends.

Some companies follow the

To page 142

CHEMICAL PROCESSING

## Mystified?

Has the construction of nomographs been a mystery to you?

If so, then you will want to read and collect Prof. Davis' series on

### "How to make Nomographs."

In this series, Prof. Davis clears up much of the mystery with his enlightening and delightful delving into the making of these calculation-time savers.

### Subjects

to be covered in the series include:

modulus charts, addition and subtraction charts, parallel and concurrent scales, multiplication and division charts, line co-ordinate charts.

The series of six installments has been running in the Processing and Engineering Data section as a regular feature.

It began with the August issue, continued in October, and will run through February.

The fourth installment, "Multiplication and Division Charts, Parallel and Logarithmic Scales", is presented on page 67 of this issue.



## Coal-Handling Tractor Shovel HAS BIG BUCKET... WILL TRAVEL

Will travel . . . there's the key to the extra value of an Allis-Chalmers HD-11G tractor shovel with 3¾-yd coal bucket. Its combination of capacity and mobility may be utilized in many ways.

**TRAVELS ON THE STOCKPILE** Long crawler tracks give it the stability to work right up on the storage pile . . . enables it to spread coal in horizontal layers. This eliminates the formation of flues — the main cause of spontaneous combustion.

**TRAVELS ABOUT THE YARD** The HD-11G builds stockpiles with equal ease anywhere in the yard. There is no need to limit storage piles to areas served by fixed structures.

**TRAVELS FROM JOB TO JOB** There need be no idle time for an HD-11G for it is also an expert at countless additional jobs. It can remove and load cinders, help on plant road maintenance, clear and load snow . . . handle many other yard maintenance jobs.

Your Allis-Chalmers construction machinery dealer will show you how the HD-11G can bring new efficiency to your coal and other bulk material handling operations — without the need for specialized machines. Ask to see all four tractor shovel models with buckets ranging from 1½ to 7 cu yd. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

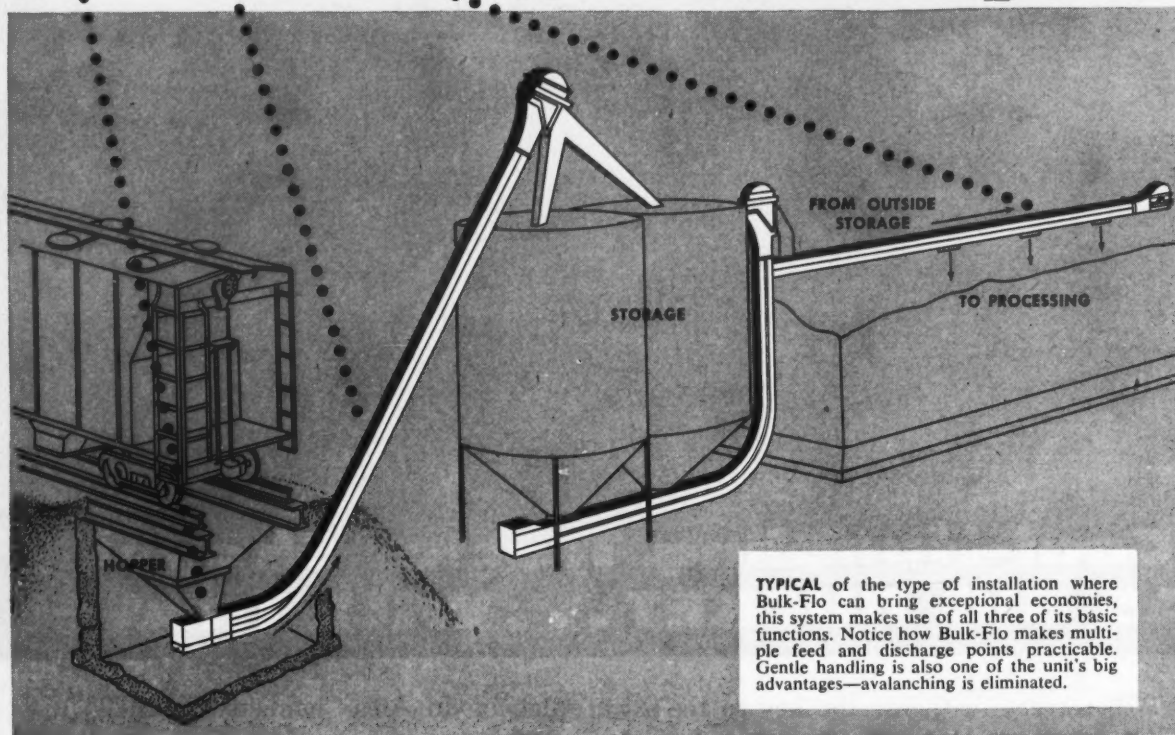
# ALLIS-CHALMERS

*Engineering in Action*

Check 2613 opposite last page.



# It's a feeder! It's an elevator! It's a conveyor!



**TYPICAL** of the type of installation where Bulk-Flo can bring exceptional economies, this system makes use of all three of its basic functions. Notice how Bulk-Flo makes multiple feed and discharge points practicable. Gentle handling is also one of the unit's big advantages—avalanching is eliminated.

**It's 3 units in 1! And LINK-BELT Bulk-Flo works equally well fully or partially loaded**

WITH its remarkable ability to combine horizontal, vertical and inclined travel . . . to feed, convey and elevate using a single drive—Link-Belt Bulk-Flo is industry's most versatile medium for handling non-abrasive, non-corrosive materials. In fact, it often replaces several units—in less space and at lower cost.

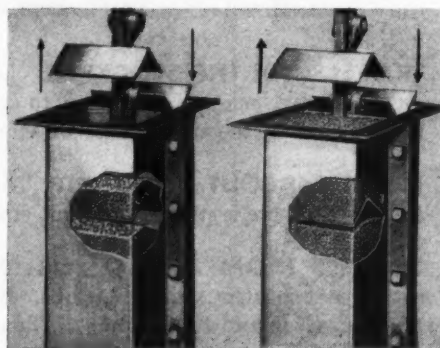
Bulk-Flo will bring you the tremendous savings it has brought to so many other plants. Let a representative at your nearest Link-Belt office give you an unbiased answer. Or write for Book 2475.

## LINK-BELT

BULK-FLO FEEDERS • CONVEYORS • ELEVATORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

14,002



**SOLID FLIGHTS** permit Bulk-Flo to operate independently of internal pressure. Thus, it needn't be loaded to full capacity in order to provide positive movement of material. Speed is constant—capacity can be varied by merely regulating amount of feed. And regardless of load, Bulk-Flo is self-clearing.

## MATERIAL HANDLING

From page 140

practice (where material is received in sealed containers with shippers' weights marked) of accepting packages without re-weighing. This is an extremely dangerous and short-sighted practice.

Shortweight shipments, shrinkage, leakage from damaged containers, and pilfering are some of the possibilities of losses in such an arrangement. The only way the recipients can make up for such losses (which can often be very costly) is to have careful records of the net weight of shipments received. It is essential that weights of all incoming shipments be carefully recorded where claims may be necessary against transportation companies.

### Weight Versus Volume Measurement

The once wide-spread practice of measuring by volume in the chemical industry is clearly obsolete at this point. It simply does not allow the close control needed on critical products. As specifications grow ever stiffer, measuring by volume is becoming more obsolete as time goes by.

In closing, I would like to stress again the importance of accurate weighing of shipments. Freight rates are high and are bound to go higher. So much so, that shipping charges now play an important role in the cost picture of the chemical processing industry, where very bulky products are common.

Unfortunately, track scales of the railroads and the weighing devices of other carriers are all too frequently far from accurate. The wise shipper will weigh shipments and have a record from his own reliable scales. All of the reasons for checkweighing receipts apply — in reverse, of course, to shipments.

(A card containing table of "Cost of Scale Errors in Pounds and Dollars" may be obtained from National Association of Scale Manufacturers, Inc., One Thomas Circle, Washington 5, D. C.)

Check 2615 opposite last page.

Check 2614 opposite last page.



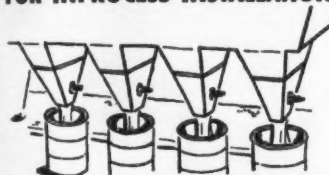
# DON'T GET Hung-up

THERE IS A Cleveland Vibrator

## FOR INCOMING RAW MATERIALS



## FOR INPROCESS INSTALLATION



## FOR PACKAGING



and for all other bin applications in the handling of dry or viscous chemicals. Prevents bridging, plugging and arching — keeps chemicals moving — eliminates processing delays.

Write today for literature and engineering details.

Air or Electric

Portable or Permanent

Silent or Standard



2706 Clinton Avenue • Cleveland 13, Ohio

Check 2616 opposite last page.

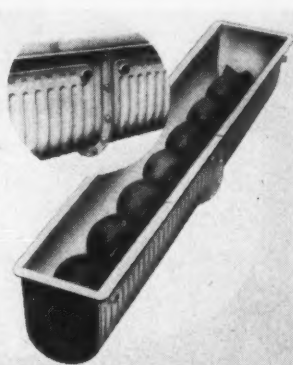
DECEMBER 1957

## MATERIAL HANDLING

**Warming or cooling trough cuts cost and weight, eases installation**

**Uses:** For cooling or heating in blenders, conveyors, mixers, kneaders, and similar devices.

**Features:** Because no jacketing, pipe, or tube coils are needed, cost of installation is



Extra tubing, coils, or jackets are eliminated with formed thermo-panel coil sections

greatly reduced. Weight of the unit is much less, and installation is easier.

**Description:** Shallow, embossed thermo-panel coil is bent to shape and size of trough wanted. Trough, or its modification, is made of two sheets of specified metal welded together. Outside sheet is embossed, to create flow channels for steam, hot water, refrigerant, etc. The inner sheet is flat and smooth, ideal for efficient flow of materials.

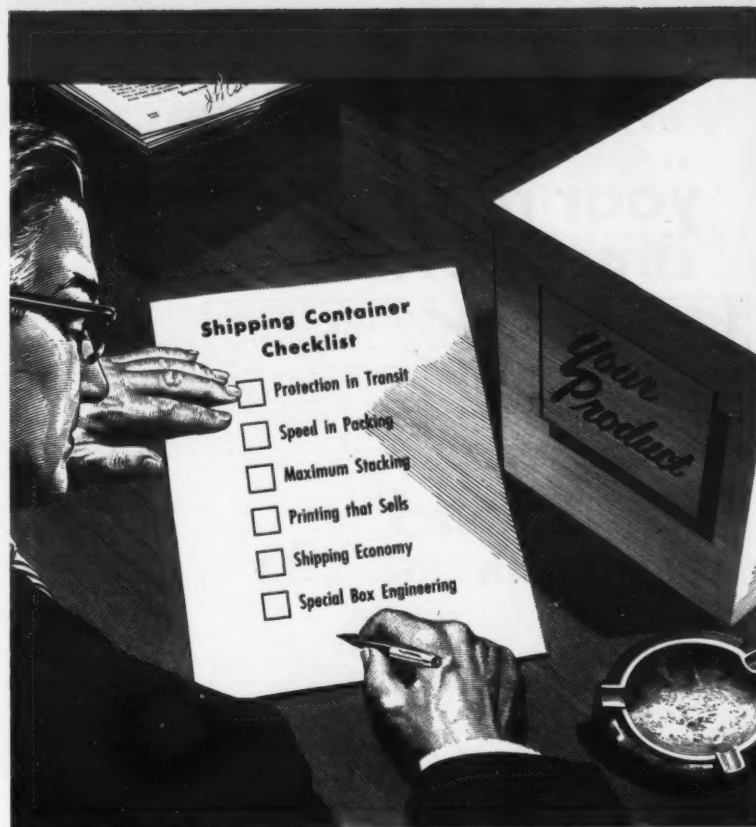
(Thermo-Panel coil is product of Dean Thermo-Panel Coil Div., Dean Products, Inc., 616 Franklin Ave., Brooklyn 38, New York.)

Check 2617 opposite last page.

## Describes tractor-loaders

Catalog of 16 pages describes and illustrates manufacturer's line of front-end loaders. Complete specifications are included. Form 1033-5-57 — Tractomotive Corporation, Deerfield, Ill.

Check 2618 opposite last page.



## CHECK THE FACTORS MOST VITAL TO YOU



SOLID FIBRE BOXES • FOLDING CARTONS  
KRAFT PAPER AND SPECIALTIES  
KRAFT BAGS AND SACKS

Whether you're President, Vice-President, Treasurer, Purchasing Agent, Sales Manager, Production Manager, Traffic Manager, Advertising Manager... the above factors in selecting the right shipping containers deserve your personal attention.

Call your nearby Gaylord packaging engineer for boxes made to your prescription.

GAYLORD CONTAINER CORPORATION • ST. LOUIS

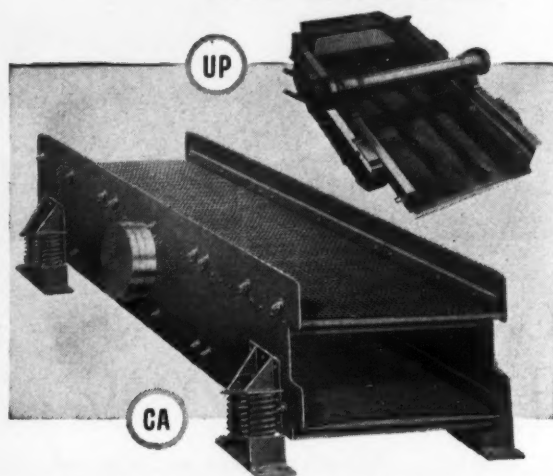
DIVISION OF CROWN ZELLERBACH CORPORATION

Check 2619 opposite last page.

# **✓ CHECK** **your material** **characteristics**

✓ BONE DRY	✓ CLAYEY
✓ WET	✓ STICKY
✓ GRANULAR	✓ FLAKY

Then **✓ CHECK**  
**with LINK-BELT**



## **Effective action of Link-Belt vibrating screens rapidly sizes any material**

For any type material you handle there's a Link-Belt vibrating screen to match—the UP for light to medium-weight materials . . . the CA for medium and heavy-duty operations. Smooth, powerful action assures fast, accurate sizing, with vibration amplitude adjustable for maximum efficiency. Both screens are available with single or multiple decks. Get full facts from your nearest Link-Belt office. Ask for Book 2554 (CA) and 2377-A (UP).

### **These LINK-BELT accessories help maintain a clean screen**

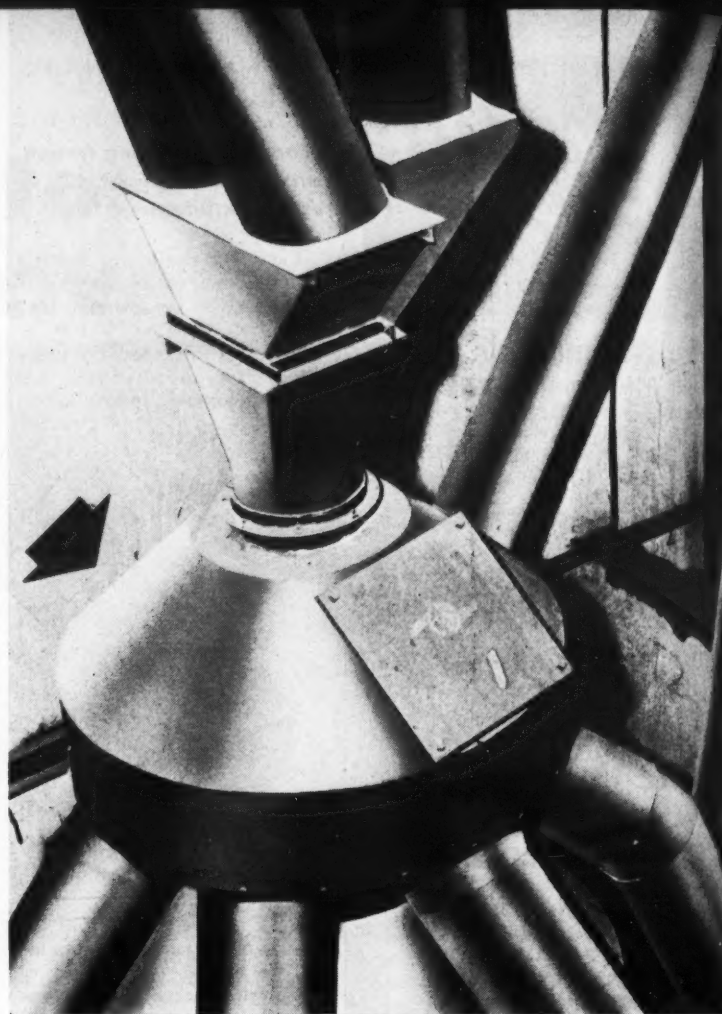
For positive prevention of blinding and plugging in the handling of damp, sticky, clayey materials. Link-Belt offers *electrically heated screen cloths*. And for applications where electric heating is impossible or impractical, Link-Belt's *bouncing ball deck* assures uniform cleaning action.

# **LINK-BELT**

**VIBRATING SCREENS**

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarborough (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,511

Check 2620 opposite last page.



Electric distributor (arrow) handles distribution of dry free-flowing materials in conveying systems. Supervision is from remote control panels

Here is an electrical device which mounts in conveying systems and . . .

## **gives remote supervision** **of material distribution**

Distribution of dry free-flowing bulk materials from or into conveying systems, bins, sifters, etc., can now be accomplished by electrical operation supervised from remote control panels. Distributing unit is completely self-contained, weather-proof, and dust-tight. It is adaptable for mounting on elevator legs, collectors, bins, sifters, mixers, and screw and belt conveyors.

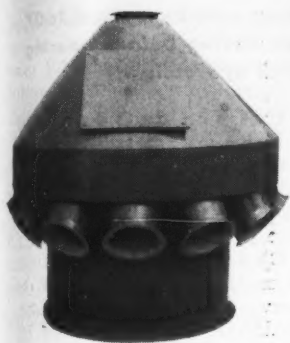
Units containing five through twenty

openings of diameters six through twelve inches are available. Heart of unit is swivel spout which revolves inside stationary distributor head.

By viewing indicator lights on control panel, an operator knows when swivel spout is positioned on selected outlet. Light remains on until spout position is changed by operator to a different selected outlet.

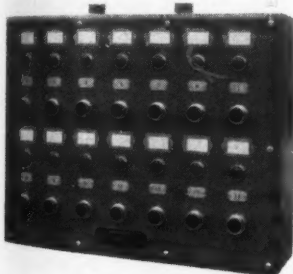
Revolving spout is set on ball bearings

## MATERIAL HANDLING



Distributing unit contains swivel spout which revolves to selected opening to direct material flow as desired

Control panel contains lights to indicate swivel spout position. Safety device prevents operator from disrupting machine should he press more than one switch at one time



and takes 28 seconds to make one complete circle of distributor. Electromagnetic brake on motor that revolves spout assures user that, when spout is positioned, it will stay put until position is changed by operator.

Loading position is changed by pressing numbered switch on control panel. Safety device prevents operator from disrupting machine if two or more switches are pressed at same time.

In addition to master control panel, extra monitor panels are available. Panels are identical to master unit, except they don't contain switches. These units can be placed anywhere in the plant, permitting another person to check setting position.

(Electric distributor is manufactured by Hayes & Stolz Industrial Manufacturing Co., Inc., PO Box 953, Southside Station, Fort Worth 9, Texas.)

Check 2621 opposite last page.



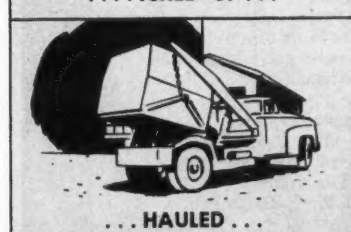
Port Arthur Refinery  
"Containerizes"  
Waste, Rubbish  
and Liquids at Many  
Accumulation Points  
... Hauls and Dumps  
Them With  
Dempster-Dumpsters



WASTE IS CONTAINERIZED ...



... PICKED UP ...



... HAULED ...



... AND DUMPED ...

## The TEXAS COMPANY "CONTAINERIZES" Waste as It Accumulates

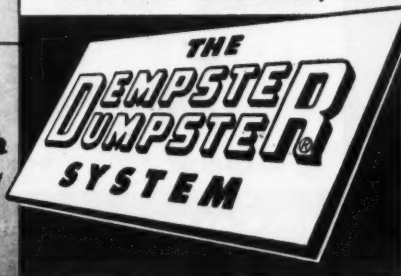
### Dempster-Dumpster Waste Disposal System Serves Leading Refineries & Chemical Plants

Waste disposal and plant cleanliness can no longer be efficiently maintained by wheelbarrows, cans, carts, or bins. Shoveling, re-handling and on-site dumping have been replaced in leading plants by "Containerization" of waste as it accumulates. By placing clean, big-capacity Dempster-Dumpster containers at accumulation points, you can save thousands of dollars annually and enjoy improved plant cleanliness.

The one-man, one-truck Dempster-Dumpster can service over a hundred accumulation points, picking up, hauling and emptying the containers on a planned shuttle schedule. Chemical plants and refineries customarily amortize their equipment investments in 18 months or less. Write today for the free booklet, below.

FREE: Write Today for Your Copy of  
"How to Reduce Waste Disposal Costs."

DEMPSTER BROTHERS, Knoxville 17, Tenn., DEPT. CP-12



To: Dempster Brothers, Dept. CP-12  
Knoxville, Tennessee

Please Send Without Obligation Your Booklet,  
"How to Reduce Waste Disposal Costs."

NAME.....TITLE.....  
COMPANY.....  
ADDRESS.....  
CITY.....STATE.....



*Snap-Tite*

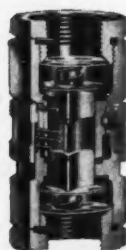
**QUICK-CONNECT**

**QUICK-DISCONNECT COUPLINGS**

*in larger sizes*

*immediate delivery*  
FROM FACTORY STOCKS

Snap-Tite's "H" Couplings are now factory-stocked for quick shipment to you, not only in the smaller sizes (below 1" ID) but in all sizes up to and including 3"—in steel, brass, aluminum, and 303 and 316 Stainless Steel. And "H" Couplings can be made to your order, up to 10" ID.



Available with valves to give two-way or one-way automatic line shut-off, or without valves for straight-thru flow, "H" Couplings are built to handle high pressures in hydraulic and air systems.

Recessed valve washers . . . fluted valve stems . . . valve stops with minimum flow restrictions . . . large inside diameter—allow maximum flow capacity with lowest pressure drop.

See the Snap-Tite representative in your city or write for Bulletin 240.

*Snap-Tite, INC.*

UNION CITY 6, PENNSYLVANIA

SNAP-TITE'S "H" COUPLING,  
SIZE FOR SIZE, IS THE  
SMALLEST COUPLING WITH  
HIGHEST STRENGTH AND  
HIGHER EFFICIENCY

**SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS**

Check 2622 opposite last page.

## MATERIAL HANDLING

**Drums can be rotated 360° for mixing before pouring with hydraulic lift**

**Uses:** For lifting drums and containers.

**Features:** Release of drum lock permits rotating drums 360° for mixing contents before pouring.

**Description:** Hydraulic drum lift is constructed of heavy-duty square steel tube. Hydraulic jack is actuated by foot-operated pedal and will lift at rate of 1-1/2" per pedal depression. Lifting weight capacity is 750 lb. Lift is mounted on 4" oil-, gas-, and spark-proof ball-bearing casters. Floor-lock holds unit rigidly in position, and drum-lock holds drums in pouring position.

Lift can be equipped with girdle to handle either standard 55- or 30-gal steel drums or fiber containers up-to-and-including 23" in diameter. Special girdles for handling cylinders, carboys, and other steel barrels are available.

(Model BM 3 "High Boy" hydraulic drum lift is product of Sterling, Fleischman Co., PO Box 94, Broomall 3, Pa.)

Check 2623 opposite last page.

**Air-operated vibrator is light-weight, easy-to-install**

**Has only two parts, excluding base**

**Uses:** For moving all types of bulk materials, including cement, sand, gravel, grain, chemicals, and coal through bins, chutes, hoppers, and tubes.

**Features:** By using aluminum cylinder, weight savings from 106 to 125 lb are possible. Reduction of weight simplifies installation, especially when vibrator is being mounted some distance off ground.

**Description:** Air-operated vibrator has only two parts, not including optional base. Steel piston is housed in cast aluminum or semi-steel cylinder block. Assembly is

## MATERIAL HANDLING

bolted either directly to bin, or to base-plate welded on bin. Vibrator is permanently lubricated with molybdenum disulfide, dry film lubricant. Unit is available with 2" diameter piston or 4" diameter piston.

(Air-operated vibrator, type KO, is product of The Cleveland Vibrator Co., 2823 Quinton Ave., Cleveland 13, Ohio.)

Check 2624 opposite last page.

### Conveyor components easily bolted together in many combinations

**Uses:** For heavy-duty industrial material handling.

**Features:** Basic components of unit can be easily bolted together in many combinations.

**Description:** Seven components of belt conveyor are: Center drive unit, end drive unit, loading section, an end take-up unit, vertical curve, intermediate sections, and end unit. Formed-steel channel construction, 6 1/4" deep, is featured throughout. Floor supports permit permanent or flexible installation in addition to vertical adjustment. Three standard widths of 18, 24, and 30" are available. Choice of drives, speeds, roll spacing, and types of belting are offered.

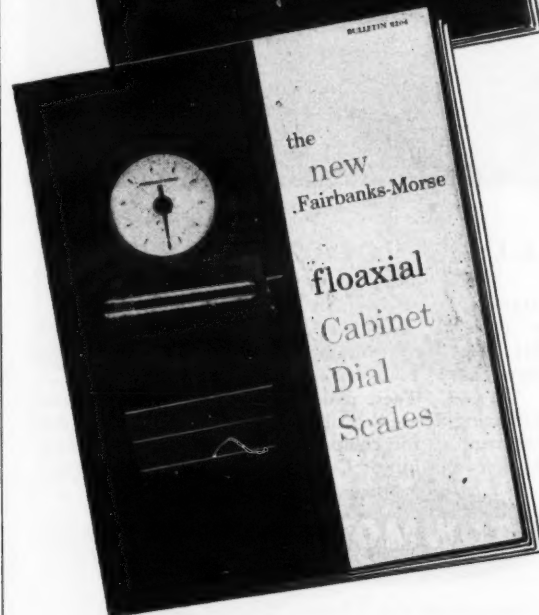
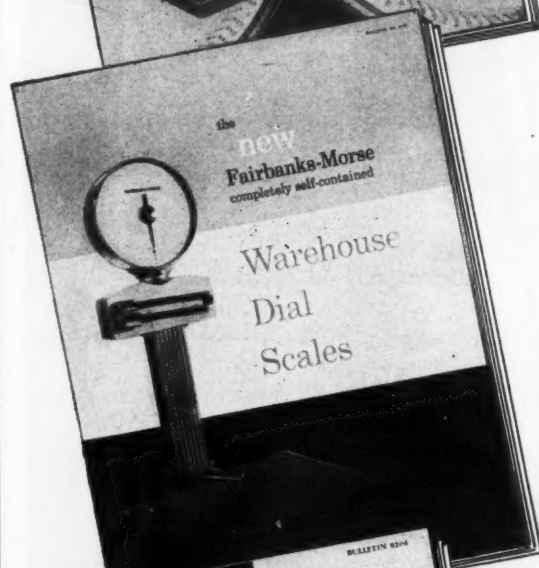
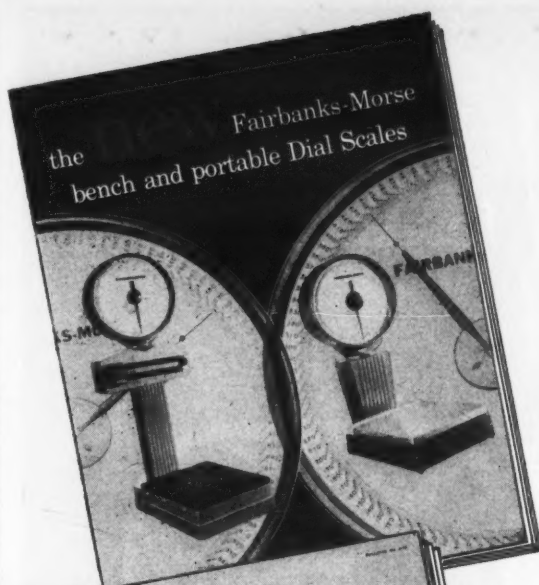
(Series "G" Unibilt Belt Conveyors are product of Conveyor Specialty Co., Inc., 33 Newport Ave., North Quincy 71, Massachusetts.)

Check 2625 opposite last page.

### Rollers for conveyors

Various types of rollers and frames for manufacturer's gravity and live roller conveying systems are described and illustrated in four-page bulletin. Blueprints and specifications on rollers to meet any operating condition are included. Roller Bul — The Alvey-Ferguson Co., 1828 Disney St., Cincinnati 9, Ohio.

Check 2626 opposite last page.



## what's inside the Floaxial?

What makes it better than the great Fairbanks-Morse scales of the past? Maybe you're not curious. Maybe you're satisfied just so long as it weighs ever more precisely, is able to stand even more abuse, and practically does your thinking for you in the process of coming up with the right answer.

But if you're mechanically minded and would be interested in how all this is accomplished, the story of the inner workings is told in the new Floaxial bulletins which are yours for the asking.

The portable and bench models are self-contained... portables are easily moved on rubber-tired wheels. Self-contained warehouse scales equipped with either pillar or cabinet type Floaxial dial are built to set on floor or installed with platform flush with floor. Cabinet dials have the exclusive F-M direct-reading feature that enables the weighman to read the dial right at the point of the indicator without mental calculation—regardless of the number of drop weights applied. Cabinet dials are available for use with many types of lever systems. Fairbanks, Morse & Co., Chicago 5, Illinois.



## FAIRBANKS-MORSE

a name worth remembering when you want the BEST

SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

Fairbanks, Morse & Co.  
600 South Michigan Ave.  
Chicago 5, Illinois

CP-12

Please send me the Floaxial Scale Bulletin specified below.

- ☐ Bench and Portable Dial  
☐ Warehouse Dial  
☐ Cabinet Dial

Name \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

City and State \_\_\_\_\_

Check 2627 opposite last page.





## ...here's "manpower" that hands you a bonus!

Think how many of your plant's handling jobs can be accomplished with much less effort—swiftly and profitably—by one operator "teamed up" with a powerful Towmotor fork lift truck!

You get an entirely new concept of modern mass-handling. You get a "bonus" in extra profits because you multiply manpower with the payroll you have. And you get a bonus in plant-wide morale when work flows on-schedule through every department . . . effortlessly . . . with a bigger day's work done.

Called the "ideal" fork lift truck by management and operators alike, the latest Towmotor models offer exclusive features as advanced as these, at no extra cost:

- New-concept functional engineering
- Simplified dual-entry compartment
- Full-traction weight distribution

**Leaders for 38 years  
in building Fork Lift  
Trucks and Tractors**



Gerlinger Carrier Co., Dallas, Oregon, is a subsidiary of Towmotor Corporation, Cleveland, Ohio

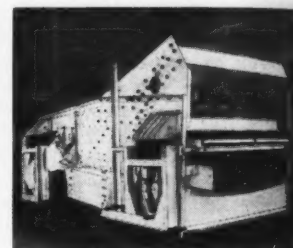
Check 2628 opposite last page.

## MATERIAL HANDLING

### German conveying unit manufactured in US

Under a licensing agreement with Carl Schenck Company of Darmstadt, Germany, the complete line of Schenck-designed vibrating feeders, screens, and conveyors are being manufactured in the United States. The Schenck Company has long been a leading European manufacturer of conveying equipment.

Schenck feeders, screens, and conveyors have wide va-



Using the unique "micro-thrust" exciter unit, German designed Vibro-screen moves material in series of parabolic arcs

riety of applications in handling of bulk materials such as chemicals, cement clinker, ferrous and non-ferrous ore sinter, coal, crushed stone, abrasive materials, and materials too hot to be transported by other means.

(Schenck conveying equipment is manufactured in the United States by Dravo Corporation, Neville Island, Pittsburgh 25, Pa.)

Check 2629 opposite last page.

### Simple formula-board unit makes for greater speed and accuracy

Complete automation in  
proportioning control

**Uses:** As means of achieving complete automation in program control of batching.

**Features:** When unit is used for pre-setting weight data in automatic proportioning panel, it eliminates need for manual weight-settings and possibility of human error in electronically controlled operations in-



## MATERIAL HANDLING

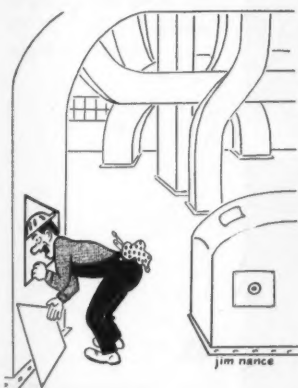
volving proportioning of bulk material.

**Description:** Simple and compact formula board and panel are used as components in manufacturer's system which provides automatic control over storing, feeding, conveying, weighing, mixing, and discharging of bulk ingredients. Board is especially useful for processors using many mixing formulas with frequent changeover. Interruptions involved in changing from one formula to another are eliminated by simply removing one formula board and replacing it with another of pre-determined settings.

Operators need only insert formula board into position and press starter button. The rest is completely automatic, and proportioning and mixing operations are continued without interruption. Rugged, durable formula board can be used in any field of operation despite dusty and dirty plant conditions. There's no limit to amount of ingredients or functions that can be controlled with formula board.

(Formula board is product of Richardson Scale Co., Clifton, New Jersey.)

Check 2630 opposite last page.



"Stay where you are—we're sending a searching party in after you."

Thanks to Jim Nance, Lion Oil Company, El Dorado, Arkansas.

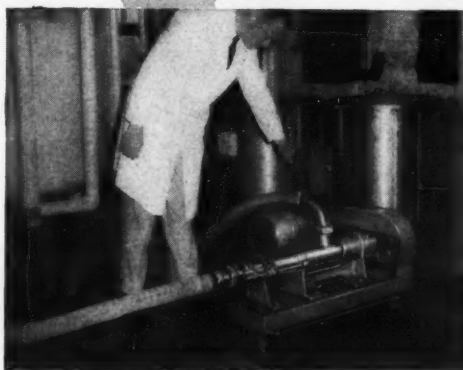
# MOYNO PUMPS

## CUT HANDLING COSTS

### at Merck Sharp & Dohme, Division of Merck & Co., Inc.



*...pumping mouthwash and general alkaline solutions*



Moynos, with their "progressive cavity" pumping principle, provide a vital production lifeline at Merck Sharp & Dohme, Division of Merck & Co., Inc. They use Moynos to pump a variety of products, from water-like mouthwash to heavy pastes with viscosities up to 20,000 centipoise. The pump at the left, with a capacity of 30 GPM at 600 RPM, moves mouthwash and general alkaline solutions. Moynos have enabled thousands of plants to pipe different materials formerly moved by hand and other expensive means. They are the only pumps that will handle many difficult materials such as abrasives, pastes, slurries, chemicals, foods, suspended solids, etc., without foaming, aerating, crushing or excessive pump wear.

Examine your processing methods. No doubt there are several places where Moyno Pumps can drastically cut costs. Ask us. We'll give you a prompt answer. Send us an outline of your problem today! Write for Bulletin 30-CP.

## ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO

BRANTFORD, ONTARIO



Motors



Fans



Hoists



Moyno Pumps



Propeller (Industrial) Fans

Check 2631 opposite last page.

# Ask Standard

*how to  
cut costs with  
conveyors*



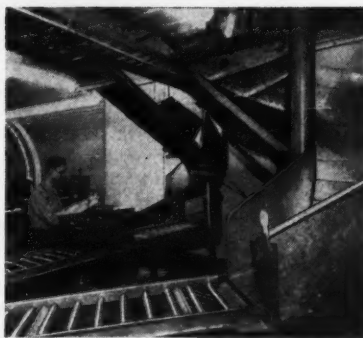
Although over 19,000 items are stocked, conveyors permit fast and efficient assembly, checking and packing — orders ride safely in durable, lightweight tote boxes.

## Milwaukee wholesale drug firm ups order-filling 50% with 3-floor conveyor system

WITH conveyors, The F. Dohmen Company, Milwaukee, Wisconsin, designed a system which has permitted them to fill upwards of 50% more orders per day . . . reduce to a minimum, excessive overtime costs . . . reduce errors, delays and merchandise damage. Standard belt and roller conveyors connect every department in the firm's three-story warehouse.

This installation is typical of what Standard can do to solve material handling problems. Standard designs and builds permanent and portable systems and units, using roller, belt, slat, chain, pushbar or sectional conveyors — power or gravity; also spiral chutes and pneumatic tube systems.

For complete facts, consult STANDARD CONVEYOR COMPANY, General Office: North St. Paul 9, Minnesota. Sales and Service in Principal Cities.



Floor-to-floor route of conveyor system assures minimum wasted motion by employees. Above, "close-out" checker makes final inspection of orders.



For details on Standard Conveyors of all types, contact the Standard representative listed in your classified phone book or write direct. Ask for Dept. P-12.



Check 2632 opposite last page.



PACKAGING

## 1500-lb container offers shipping, handling savings



①

Eight-sided corrugated container, coming knocked down and equipped with corrugated pallet . . .



②

. . . sets up in less than two minutes without need for gluing or taping . . .



③

. . . to contain up to 1500 lb of granular materials.

An eight-sided container which carries up to 1500 lb of granular materials is designed to offer the user savings in handling and shipping costs.

Less manpower is required for handling since one container can replace six to eight smaller standard units.

As can be seen in the pho-

tographs, container is easy to set up, handle and ship without the use of glue, tape or steel strapping.

("Octainer" is manufactured by St. Regis Container Co., a subsidiary of St. Regis Paper Co., 150 East 42nd St., New York 17, N.Y.)

Check 2633 opposite last page

4

Container is ready to be filled immediately after setting up, and no steel strapping is needed . . .



5

. . . as top is held in place by a sleeve extending 10 inches down from top to give rigid container . . .



6

. . . that can be stacked four or five high without bulging.



## skyhooks to liners

Now—get greater protection and more rugged service from your drum and package liners. Specify visqueen "L" Film—a special polyethylene developed for Operation Skyhook.

Unique, new production processes make visqueen "L" Film stronger, tougher, and as pinhole free as a polyethylene film can be. visqueen "L" Film is the perfect economical liner material for shipping corrosives, acids and adhesives.

Write for samples and see why.

**Important!** visqueen Film is all polyethylene, but not all polyethylene is visqueen. Only visqueen film has the benefit of research and resources of visking Company.

balloon film sample request

**visqueen**  
Trade Mark

clip this tag,  
attach to letterhead and mail

CP12-1410

PLASTICS DIVISION  
**visking COMPANY**

P.O. Box 1410 Terre Haute, Indiana  
In Canada: visking LIMITED, Lindsay, Ontario.

Division of



Corporation

Check 2634 opposite last page.



**NEW!**  
from  
**EXACT**  
**WEIGHT..**



## Basic Weight Classifier

### For sorting of items by weight

Exact Weight's new Basic Classifier, employing Shadograph Scales with photocell controls, provides light signals which indicate correct weight, or over or under within pre-set limits. Accuracy is increased far beyond the scope of visual sensitivity. Any number of classifications can be obtained, from 2 to 128, and items of any shape or size can be handled in a capacity range from 2000 milligrams to 100 pounds.

The control system not only provides light signals, it may be used to actuate automatic transfer mechanisms, chart recorders for statistical and quality control, and to operate counters or alarm signals.

Write for Bulletins 3333 and 3347.



Sales and Service  
from Coast to Coast



### THE EXACT WEIGHT SCALE CO.

905 W. FIFTH AVE., COLUMBUS 8, OHIO

In Canada: P.O. Box 179, Station S, Toronto 18, Ont.

BETTER QUALITY CONTROL . . . BETTER COST CONTROL

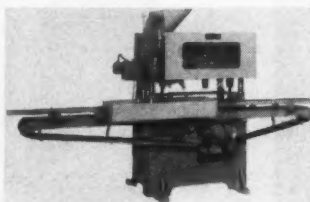
Check 2635 opposite last page.

## PACKAGING

**Automatic can sealer handles any size cans from pints to gal**

Uses: For sealing cans.

Features: Conventional methods of handling containers are no longer necessary for this machine. Containers go right into automatic sealer direct from filling machine without any operator in attendance. Changeover from one size container to another is just a matter of a few minutes.



Cans using standard one-inch seal can now be sealed automatically

Description: Can-sealing machine will handle from pints to gallons on center-hole type cans, and up to quarts on off-center cans, at speeds up to sixty per minute. All that is required is to load hopper with lids, make few adjustments to suit the can being run and switch on the machine. Machine is equipped with two 1/2-hp motors. Conveyor height is 33" minimum, and overall length is 9' minimum.

(Can sealing machine is manufactured by Resina Automatic Machinery Co., Inc., 572 Smith St., Brooklyn 31, N.Y.)

Check 2636 opposite last page.

### Bulk gas delivery

Illustrated, 16-page catalog discusses bulk delivery method of handling industrial gases in large quantities. Several types of delivery units are illustrated and advantages of each are explained. Cat 450 — Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 150 East 42nd St., New York 17, New York.

Check 2637 opposite last page.



Left — Union Special Style 20100 H Bag Closing Machine

Here's how to close  
**MULTIWALL PAPER BAGS**

FOR lower production costs . . . stronger, neater closures . . . ability to get out rush orders in a hurry, you can't beat Union Special Bag Closing Machines! Specially built to stand up under heavy production schedules, these machines provide the high output rates needed to meet modern competitive conditions.

In the Union Special line, it's easy to find the right unit to meet your particular requirements. ASK FOR RECOMMENDATIONS.

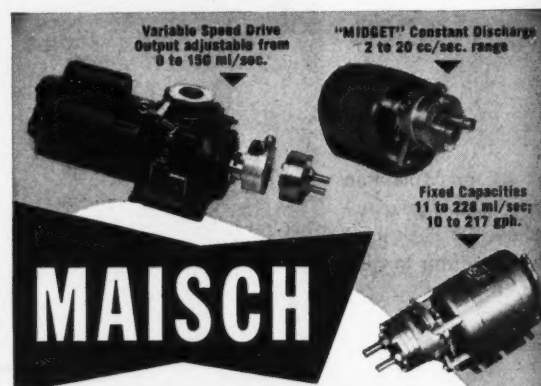


SEND FOR THIS BULLETIN!

Get your copy of this 16 page illustrated bulletin containing helpful data and charts on the complete Union Special line of bag closing machines. UNION SPECIAL MACHINE CO., 442 North Franklin Street, Chicago 10, Illinois

## UNION SPECIAL

Check 2638 opposite last page.



**MAISCH**

### METERING PUMPS

- STAINLESS STEEL — OILLESS BEARINGS — STERILIZABLE
- POSITIVE DISPLACEMENT — SMOOTH, NON-PULSATING FLOW
- FOR HOT, COLD, VISCOUS OR WATERY FLUIDS
- ACCURATE WITHIN 1 TO 2%

Maisch Metering Pumps are simple in design, ruggedly built for long service, and can be depended on to maintain accuracy indefinitely. Exclusive design features insure optimum performance. Particularly suited for handling chemicals, syrups, oils, glue, processing solutions, etc. Quick demountable or fixed heads. Fixed capacity pumps available in wide range of output. Pumps in stock for immediate delivery. Sanitary Metering Pumps available in capacities to 76 gph. meet all existing sanitary requirements. Write for complete details.

### MECHANICAL PRODUCTS CORPORATION

174 North Ogden Avenue • Chicago 7, Illinois

Check 2639 opposite last page.

CHEMICAL PROCESSING

**Offers polyethylene drum  
for use as single-trip,  
non-returnable unit**

Uses: Shipping 800-lb gross weight of regulated and non-regulated products.



Single trip polyethylene drum in fiber overwrap is light and easy to handle

**Features:** Polyethylene drum has been developed to be sold as a single trip, non-returnable drum with fiber or steel overwrap. Container has been approved by ICC, OFC and NMC for shipments under test permits.

**Description:** Drum is molded in one piece without welds or seams. It is supplied with any desired combination of filling and emptying closures.

(Polyethylene drum is manufactured by Delaware Barrel and Drum Co., Dept. CP, Wilmington, Delaware.)

Check 2640 opposite last page.

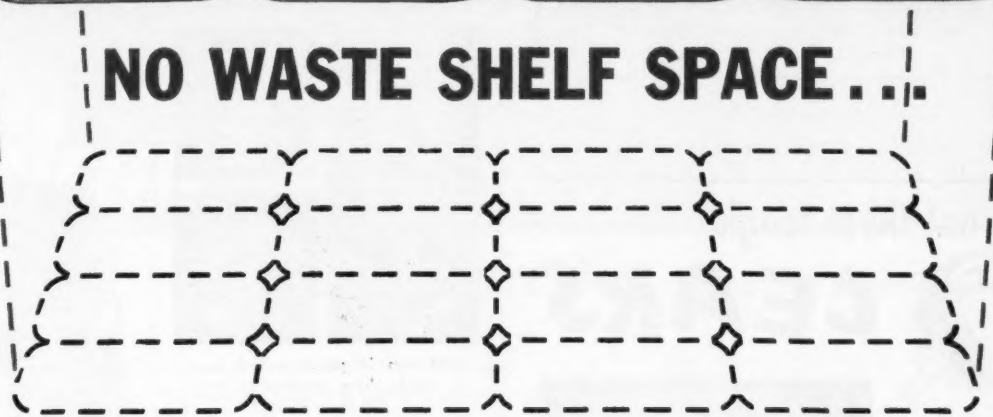
#### Aerosol guide book

Consolidation of all testing methods, regulations, and recommended practices developed over last 10 years by pressurized packaging industry are presented in 96-page aerosol guide book. To obtain "Aerosol Guide," remit \$8.00 plus postage direct to Chemical Specialties Manufacturers Association, Inc., 50 East 41st St., New York 17, N. Y.

## FLAT SURFACE FOR BETTER DISPLAY...



## NO WASTE SHELF SPACE...



### with Continental "F" STYLE cans

If ever packages were tailor-made to sell your wax, polish and other petroleum products, Continental's "F" style cans are the packages. Handsomely lithographed by Continental master craftsmen, the broad, flat surface of every "F" style acts just like a poster—makes your product more attractive and easier to see. And, because of their space-saving, oblong shape, "F" style cans let grocers stock *more* of your product per shelf

foot, meaning greater sales opportunities.

Let us start you off with all the "F" style cans you need. Sizes four ounce (spout top) to one gallon. Then, if you need engineering or research help, it's available as part of our Tailor-Made Package Service. Call soon for the packages with more "see," more "sell"—Continental "F" style cans. Rapid delivery from shipping points across the U. S.

## CONTINENTAL © CAN COMPANY

Eastern Division: 100 East 42nd Street, New York 17, New York  
Central Division: 135 South LaSalle Street, Chicago 3, Illinois  
Pacific Division: Russ Building, San Francisco 4, California



Check 2641 opposite last page.



## NEW! Portable Electric Bag Closing Machine



CLASS  
2100

HERE is a handy little machine that makes bag closing fast, easy, and economical. It is recommended where operations are limited or intermittent and do not justify installation of large, high production machines.

**LIGHTWEIGHT**—9½ pounds. Carry it anywhere. No installation; requires only an electrical outlet.

**POWERFUL**—Direct drive motor with thumb control button. Exclusive top and bottom feed for greater power and production.

**VERSATILE**—Closes bags made of cotton, burlap, jute, multiwall paper, laminated paper.

**SAFE**—Anyone can operate it. No special training required. Comes with shoulder strap or can be obtained with overhead suspension. Send for descriptive literature.

**Union Special MACHINE COMPANY**

Originator of Filled Bag Closing Machines

442 North Franklin Street

Chicago 10, Illinois

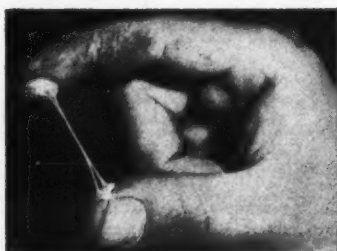
Check 2642 opposite last page.

Lock out those tough



# LEAKS

Tacky and sticky enough to hold on to any surface. Smooth and creamy in texture . . . not porous or grainy. Sets up a springy elastic seal that seems "alive".



Leak Lock is a special purpose joint sealer designed to solve difficult leaking joint problems in all industries. It has been notably successful in the chemical, petroleum, atomic energy, electronic and refrigeration fields.

The plastic resin base stays elastic, thus eliminating the inefficient hard, crumbly texture found in ordinary sealing compounds. It is not affected by temperature or by vibration. Try it yourself. Highside Chemicals Incorporated, 16 Colfax Avenue, Clifton, N. J.

Send for FREE SAMPLE on your business letterhead

**Leak Lock**

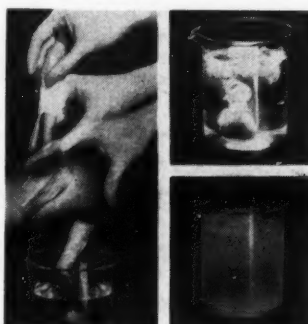
Check 2643 opposite last page.

## PACKAGING

Wash day woes, Mother?  
Don't toss in towel —  
toss in bag, soap and all

Too much or not enough soap in the washer and spilled boxes of soap powder are irritants the housewife will not have to contend with in the near future. Mother will be able to eliminate these little wash day woes simply by tossing a pre-measured bag or pouch of soap powder into her washing machine without bothering to open it. The package will dissolve in a matter of seconds, freeing the soap to do its work.

This minor miracle is made possible by a new water-soluble, transparent, packaging material. Dubbed "Reynolon", the polyvinyl alcohol water-soluble film is offered as a packaging material for



Just toss in pre-measured bag — whole thing dissolves in matter of seconds

soaps, detergents, fertilizers, paints and tints, anti-rust agents, insecticides, and other water dispersable products.

Along with providing product protection during shipping and storage, the film will eliminate the bothersome step of opening the package, and the possibility of spilling the contents. When used for packaging insecticides or other harmful agents, it will eliminate the need for any direct bodily contact with the product. Contact clarity permits product display applications.

("Reynolon" is product of Reynolds Metals Company, 2500 South Third St., Louisville, Kentucky.)

Check 2644 opposite last page.

## LIQUID PROCESSING

DEPEND ON ADVICE FROM ALSOP

Engineering and Laboratory assistance, at no charge, to solve your equipment problems in...

... LIQUID FILTRATION

... LIQUID MIXING

... LIQUID STORAGE

... LIQUID PUMPING

Remember, a complete report on your liquid processing problems is FREE!

DEPEND ON EQUIPMENT FROM ALSOP

**ALSOP**  
Engineering Corporation  
1212 Alsop Square  
Milldale, Connecticut

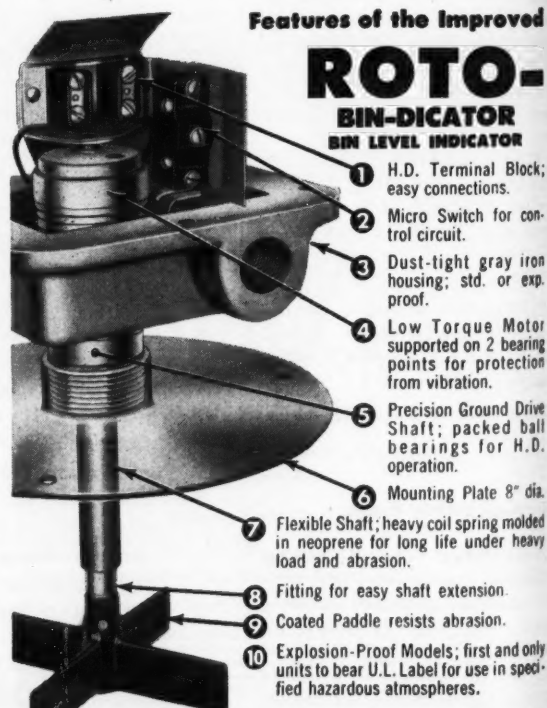
Send for analysis forms and literature.

Check 2645 opposite last page.

Features of the Improved

## ROTO-BIN-DICATOR

BIN LEVEL INDICATOR



**THE BIN-DICATOR CO.**

13946-D Kercheval • Detroit 15, Mich.

Write for Bulletin BD-8C or call

VALley 2-6932

WE SELL DIRECT • PHONE ORDERS COLLECT

Check 2646 opposite last page.

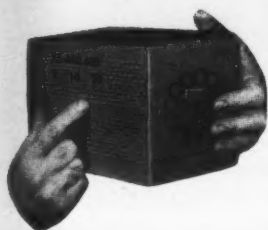
CHEMICAL PROCESSING



## PACKAGING

### Company promotes safety, adopts non-skid cartons for reagent shipping

Elimination of accidents and promotion of better safety conditions in chemical stockrooms and warehouses, is the aim of Fisher Scientific Company in adopting non-skid



Tiny welts in paper-board tops and bottoms of cartons will help keep stacks safely in place on stockroom or reagent shelf

cartons. Fisher has announced that it will routinely package its chemicals in the cartons which contain hundreds of tiny welts in paperboard tops and bottoms. This non-skid feature will prevent dangerous and costly accidents caused by slippage in the storing and shipping of chemicals. Cartons come set-up, filled with bottles, from supplier.

(Non-skid cartons are supplied by Owens-Illinois Glass Co., Princeton, N.J.)

Check 2647 opposite last page.



# Vulcan

## delivers steel pails

**faster, SAVES YOU SPACE AND MONEY!**

This is a true case history of all the companies who use Vulcan steel shipping containers. Their composite story reads like this: delivery of pails forced them to tie-up excessive funds and space in a big inventory. They switched to Vulcan, and got faster delivery, in all quantities, on a precise and rigidly maintained schedule. Their inventory needs dwindled rapidly, and they had more free cash and manufacturing space. The same thing can happen to you, because Vulcan is an expert authority engaged exclusively in the manufacture of steel pails and drums, and maintains the largest warehouse stock of these items. This means we can deliver your needs and inventory savings at the same time. May we prove it to you?

**NOW! REDUCE STEEL CONTAINER INVENTORY COSTS! MAIL THE COUPON TODAY FOR TEST SAMPLES AND THE NAME OF YOUR VULCAN REPRESENTATIVE!**



Hi-Bake protective linings • one to 55 gallon capacities all variations of open or closed heads • faster delivery from the largest warehouse stock • from a carton to a carload • brand name decoration • special designs

**VULCAN**  
CONTAINERS INC.  
Bellwood,  
Illinois

#### VULCAN CONTAINERS INC., Bellwood, Illinois

Gentlemen: I am interested in:

- ☐ Pails, in the following sizes, .....
- ☐ Hi-Bake protective linings for (product) .....
- ☐ 55 gallon drums.

Please get this information to—

Name .....

Company .....

Address .....

City .....

Zone ... State ...

Check 2648 opposite last page.

## We're looking for IRON TROUBLE

If you have it. . . .  
get rid of it with



**ELECTROMAGNETIC  
SEPARATORS**

Count on Frantz FERROFILTERS — Gravity, Underfeed or Pipeline types — to remove even the finest contaminating iron particles from liquids and slurries. Result: a cleaner product of improved quality that helps increase customer acceptance for your goods.

Send for BULLETIN 46-E

**S. G. FRANTZ CO., Inc.**

Brunswick Pike & Kline Ave.,  
P. O. Box 1138 Trenton 6, N.J.

Check 2649 opposite last page.



GRAVITY FERROFILTER in continuous use for 13 years cleaning body slip and glaze in a plant making some of the country's finest chinaware.

## IF IT'S TOUGH TO PUMP...

You need a  
**SHRIVER  
DIAPHRAGM  
PUMP**

for

- ✓ Corrosive
- ✓ Abrasive
- ✓ Viscous
- ✓ Thick • Heavy
- ✓ Delicate
- ✓ Hazardous Materials

Bulletin 137 tells why.

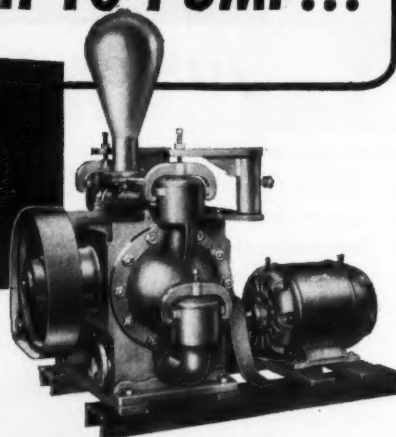
**T. SHRIVER & COMPANY, Inc.**

Filter Presses • Filter Media • Diaphragm Pumps

846 Hamilton St., Harrison, N. J.

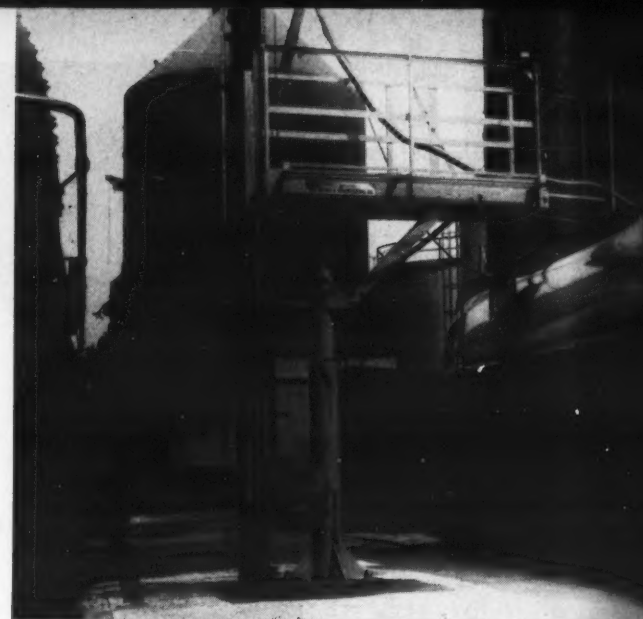
Sales Representatives in  
Decatur, Ga.—Houston, Tex.—St. Louis, Mo.  
San Francisco—Montreal—Toronto

Check 2650 opposite last page.



### POINTS TO REMEMBER

- No contact between fluid handled and mechanical parts of pump.
- No packings, hence no leakage.
- Easy to inspect and clean.
- Minimum maintenance cost.
- Parts contacting fluid made of any metal, rubber or synthetic resin lined.
- Ample pressure; wide capacity range.



Throughout entire loading period, it is unnecessary for operator to step upon tank car or truck. Both hands are free to perform required work with flexible platform which furnishes —

## Safe loading of tank cars and tank trucks

GORDON WEYERMULLER, Associate Editor

With A. ROSENAU, Safety Director  
Barrett Division, Allied Chemical & Dye Corporation  
Philadelphia, Pennsylvania

**Problem:** Prior to July 1956, method of loading tank cars of phthalate esters at the Barrett Division plant of Allied Chemical in Philadelphia made it necessary for operator to climb on car where insecure footing might result in a fall. Chemicals were loaded through a flexible metal hose supported by an upright steel beam. This arrangement required operator to climb on tank car to open dome cover and set the loading and ground lines.

Loading of the phthalate esters presented an especially difficult problem — as the loading lines were not adjacent to operating structure — but

in an unprotected, windswept area outside. Exposure to elements, especially during freezing weather, made climbing on tank cars treacherous.

Potential hazards involved in this method of loading tank cars led to investigation of alternate methods to eliminate necessity of climbing on cars, and to provide maximum convenience.

**Solution:** A year and a half ago a safety platform was installed at the Barrett Division plant with design features offering particular advantages in loading the phthalate esters.

A stationary platform which serves as a secure footing for

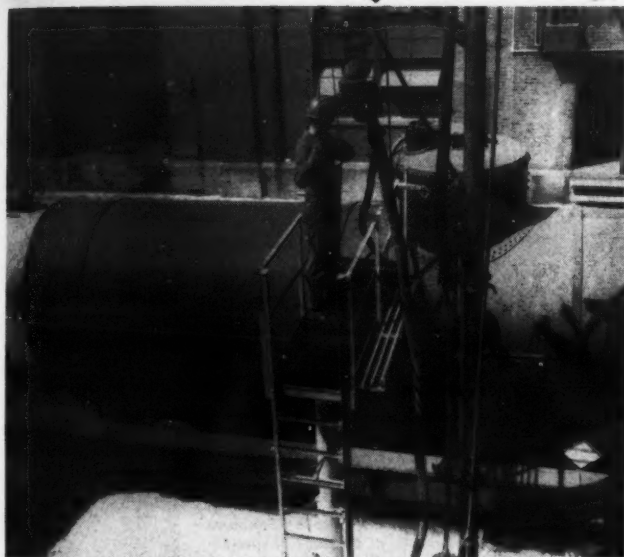


SAFETY



After a tank car is loaded, platform is rotated 180° so a tank truck can be loaded

Operator has safe, secure footing on platform



the operator is provided. Device consists of a work deck mounted on a pivoting column. In the parked position it lies parallel to the vehicle to be loaded. In the operating position it is turned from ground level — 90° — or until it is in line with the car dome. Operator may raise or lower platform by means of a simple, hand-operated hydraulic mechanism to suit the type or size of car he is handling. Work deck is always level. By extending it with a lever, perfect contact is made with the dome.

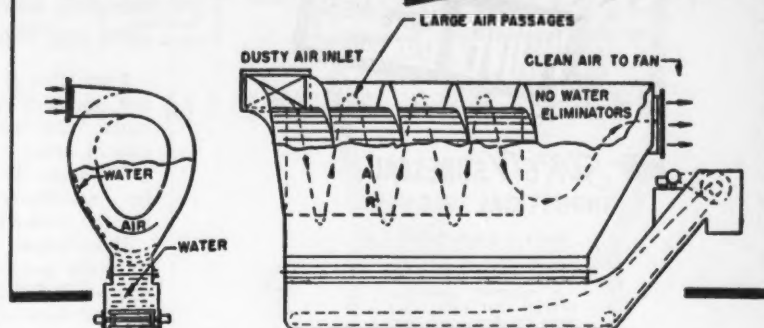
**Results:** Flexibility of the loading station at Barrett

Division provides increased efficiency as well as safety. It is regarded as a highly satisfactory answer to the problems inherent in this operation. Throughout entire loading operation it is unnecessary for operator to step upon tank car or truck. Both hands are free to perform required work. Since platform turns 360°, it can be used to unload tank cars and tank trucks at one spotting.

(NECO loading platform is product of Nichols Engineering Co., 3816 Grand Ave., Chicago 51, Illinois.)

Check 2651 opposite last page.

THIS IS THE . . . **Air Tumbler**



the master of Dust in industry ★ ★ ★

**SIMPLE — DEPENDABLE — NO FIRE HAZARD  
HIGH EFFICIENCY — CONSTANT CAPACITY  
LOW OPERATING COST**

More than one million CFM in ONE plant

Write for Bulletin No. 551. Address:

**DUST SUPPRESSION & ENGINEERING COMPANY**

P. O. BOX 67, LAKE ORION, MICHIGAN

Agents in all principal U. S. cities

Check 2652 opposite last page.

**My eyes! My face!**



**Provide instant relief with . . . HAWS  
EMERGENCY EYE and  
FACE WASH FOUNTAINS**

Eye and face hazards are inevitable in industry . . . so take positive steps to reduce the extent of injury and minimize insurance claims. HAWS Emergency Eye and Face Wash Fountains flood contaminated areas with water — instantly ridding face and eyes of caustics, chemicals and dangerous particles. This instant relief may well prevent permanent damage — bridging the gap until medical aid arrives. Install extra safety — HAWS Emergency Fountains and Drench Showers.

Write today for detailed information on the complete HAWS line of emergency facilities. HAWS DRINKING FAUCET COMPANY, 1443 Fourth Street, Berkeley 10, Calif.

Model 8933:

Face spray ring acts simultaneously with eye-wash, sending controlled streams of water from specially designed twin fountain heads.



**HAWS**

Check 2653 opposite last page.



**PROVED** more wear per pair

**SURETY SURESEAL INDUSTRIAL GLOVES**

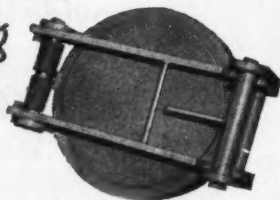
What's in a glove? Hands, you say. But, it's what's in the exclusive Sureseal glove that counts—a superior synthetic (Hycar) that withstands more chemicals, oils, acids, and rubber solvents than any we know and we make gloves from all of them. That's why Surety Sureseal outwears all others and is the standard wherever safety and service are regarded. That's why serious hand injury and costly dermatitis are banished by Surety Sureseal users. Surely if you need gloves, give Sureseals a test... we'll cooperate. Write today.

**THE SURETY RUBBER CO.**  
CARROLLTON, OHIO

In Canada: Safety Supply Co., Toronto

Check 2654 opposite last page.

## New Lenape-Lacy Tight Sealing LATCH DOOR MANWAY



### Opens in Seconds... Yet Can't Open Accidentally

Now with a new cam-lock latch door, the thoroughly proved Lenape-Lacy Manway opens even faster and with complete safety. To open, the operator simply pulls the latch handle up and away from the cover—all in a matter of seconds. The unique patented safety catch not only prevents accidental opening, but enables venting of any residual pressure before the cover is fully opened.

Supplied in sizes to 24", up to 150 psi design for temperatures to 300°F. — 18", 50 psi Style T Latch Doors for 4" and 6" depth available from stock.

Write for information.

**LENAPE**

HYDRAULIC PRESSING  
AND FORGING CO.

LENAPE HYDRAULIC PRESSING & FORGING CO.  
DEPT. 100 WEST CHESTER, PA.

RED MAN PRODUCTS

Check 2655 opposite last page.

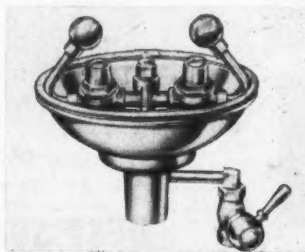
## SAFETY

### Emergency fountain Instantly washes eyes and face

**Uses:** For giving instant relief to body areas contaminated with dangerous chemicals or other injurious matter.

**Features:** Eyes and face can be simultaneously and instantly washed.

**Description:** Emergency fountain provides function of eye-wash fountain plus addition of face washing through copper ring. Two control streams of water project from



Fountain instantly washes injurious matter from eyes and face

specially designed fountain heads to flush matter from eyes, while numerous jets of water spurt from face-wash ring.

(Model 8934 emergency fountain is product of Haws Drinking Faucet Co., Fourth & Page Sts., Berkeley 10, Calif.)

Check 2656 opposite this page.

### Minimum inlet pipe size, max pressure capacity with pop safety valve

Extra long top-guiding  
gives positive protection

**Uses:** For steam generator service and air or gas applications at set pressures up to 300 lb at 450°F.

**Features:** Units offer minimum inlet pipe size with maximum pressure capacity and low cost. Extra long top-guiding gives safe, positive protection.

**Description:** Series of top-guided bronze pop safety valves are ASME approved for power boiler and unfired

## "KERODEX" protected hands wash clean without scrubbing.



even sticky tar removed easily in minutes.

"KERODEX" spreads on like a cream but acts like an invisible glove to shield the skin from the vast majority of industrial irritants such as acids, alkalis, solvents, paints, cutting oils, and resins. "KERODEX" does not smear. It does not affect materials handled, nor is it affected by them. Two types of "KERODEX" are available for "wet" and "dry" work. Write for full information on "KERODEX", barrier creams to Ayerst Laboratories, 22 East 40th Street, New York 16, N. Y.

5739

Check 2657 opposite last page.

## Prevent PULSATION Positively!

### with BURGESS-MANNING SNUBBERS

Burgess-Manning Pulsation Snubbers are products of 20 years of specialization—and engineered to your specific piping pulsation problem. They eliminate the cause of your trouble at the source with resulting improved equipment efficiency, increased production, reduced maintenance and elimination of operating hazards.



Ask for  
Case Histories  
and  
Recommendations

**BURGESS-MANNING COMPANY**

721 East Park Avenue, Libertyville, Illinois  
Dallas, Texas

Check 2658 opposite last page.

CHEMICAL PROCESSING

## SAFETY

p. V. codes. Valves have optically machined and lapped flat seat, and self-aligning disc for maximum tightness and positive shut-off. Three styles are available: with plain cap, with open lever, and with



Extra long top-guiding of "super capacity" bronze top safety valve gives safe, positive protection

packed cap and lever. Sizes range from 1/2 to 3", male inlet, female side outlet. Flanged inlets are available.

(1875 series bronze top safety valves are product of Farris Engineering Corp., 505 Commercial Ave., Palisades Park, New Jersey.)

Check 2659 opposite last page.



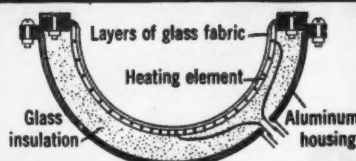
"Think of it—we might make history by just messin' with that."

# GLAS-COL

## FLASK HEATING MANTLES ARE **SAFE**

### HERE'S WHY:

*Glas-Col mantles are designed so that there's no air chamber beneath the flask where explosive vapors can accumulate if the liquid being heated boils over.*



As shown in this cross-section sketch, only glass fabric layers, heating elements, glass insulation material (which excludes the air), and the aluminum housing are below the flask being heated.

And here are other advantages offered by Glas-Col Flask Heating Mantles: Heating element resistance wire is closer together at the bottom of the mantle where extra heat is needed to "force over" the highest boiling fractions which remain to the last.

But near the equator of the flask, the resistance wire is spaced farther apart . . . heat input is less . . . the bare flask wall is not heated excessively. This is important for three reasons . . . (1) vapors cannot be superheated, (2) heat-sensitive liquids cannot be damaged by splashing against superheated flask wall, and (3) thermal shock, resulting from relatively cool liquid coming into sudden contact with the flask wall, cannot cause cracks or breakage.

Glas-Col Flask Heating Mantles are not a mere variation of a makeshift hot-plate arrangement. They're designed and built for one thing . . . the safe heating of flasks. For more information, please write: Glas-Col Apparatus Co., Dept. CP, 711 Hulman Street, Terre Haute, Indiana . . . or telephone CRawford 8408.

*Glas-Col Flask Heating Mantles have a remarkable safety record . . . extending over 16 years.*



*No enclosed air chamber here to trap explosive vapors.*

## GLAS-COL ELECTRIC HEATING MANTLES

Trademark Registered U. S. Patent Office

U. S. Patent  
No. 2,282,078

U. S. Patent  
No. 2,231,506

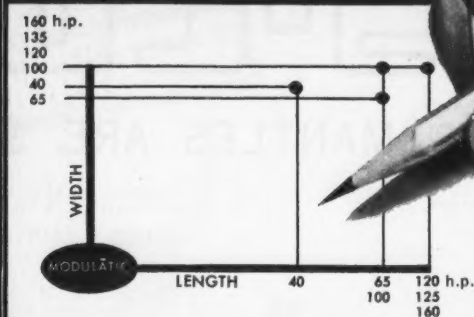
U. S. Patent  
No. 2,739,220

U. S. Patent  
No. 2,799,221



**SPECIALISTS IN LABORATORY, PILOT PLANT, AND PRODUCTION HEATING PROBLEMS**

Check 2660 opposite last page.



# IS SPACE A FACTOR IN YOUR BOILER NEEDS?

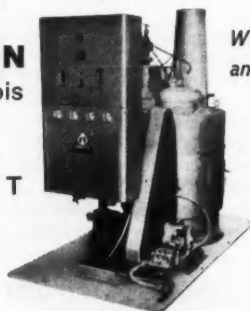
*Here's a quick easy way for you to make your own preliminary plans  
for maximum steam capacity in minimum space.*

## FREE 1/4 INCH SCALE TEMPLATE OF COMPLETE VAPOR MODULATIC WATER TUBE BOILER LINE MAKES BOILER NEED PLANNING SIMPLE

Set the template on your floor plan and select the size boiler you need — experiment with locations. Modulatic needs no enclosures, no chimney, no foundation. Put it where you want to use steam. On the roof, on a balcony, in an aisleway, hang it from the ceiling or put it in the basement. Proved by 25 years in America's toughest boiler rooms! 10 horsepower to 160 horsepower. From 5 pounds to 300 pounds pressure (higher when required).

**VAPOR HEATING CORPORATION**  
80 East Jackson Boulevard • Chicago 4, Illinois

THE WORLD'S MOST COMPACT



POWER PACKAGE

Write for your free template  
and Bulletin 586—a postcard will do.

Check 2661 opposite last page.

## SAFETY

**Thin protective gloves  
more comfortable to wear,  
corrosion-resistant**

Material has unusually high  
non-allergenic properties

**Uses:** For jobs requiring extreme finger sensitivity and resistance from corrosive substances.

**Features:** Product is thinner than surgeon's glove, yet it resists deterioration from corrosive substances and is comfortable to wear. Material has unusually high non-allergenic properties, making it ideal for most persons allergic to rubber gloves.

**Description:** Industrial gloves are made of vinyl Pylox (TM). Due to special textured inside finish, gloves can be worn in comfort all day long. They can be turned inside out for jobs requiring non-slip grip.

The gloves are resistant to normal acids, alkalis, oils, greases, and some solvents. They are especially useful on jobs where the products being handled have to be protected from bacteria or perspiration. Available in small, medium and large sizes, the gloves are 10½ inches long, offering ample wrist protection.

("Nimble Fingers" industrial gloves are product of Pioneer Rubber Co., Willard, Ohio.)

Check 2662 opposite last page.

## Radioactivity accidents and resultant dangers are prevented

'Flying squads' decontaminate danger areas

Growing use of radioactive isotopes has increased the statistical possibility of accidents which may result in dangerous radioactive contamination in laboratories, and plants. The urgent need for personnel trained in the safe handling and cleanup of such accidents was dramatically illustrated by the recent spill of radioactive materials in Houston, Texas.

As a result of this critical



## SAFETY

need, several "flying squads" of highly trained nuclear technicians have been organized and are located at Houston, Texas, Richmond, Calif., and Waltham, Mass. These highly skilled teams are available on very short notice, to travel to the location of an accident involving spilled radioactive materials, bringing with them the necessary test apparatus to find "hot" material, test for strength, "cleanse" area.

Each team would generally consist of a chemist familiar with radioactive materials, a physicist, and as many skilled



Highly trained nuclear technicians, members of "flying squads", decontaminate danger areas in radioactive "spill"

technicians as were necessary to do the job. Standing ready, is a base lab fully equipped for fast, accurate analysis.

(For more information on decontamination services, write to Abel DeHaan, Director, Western Div., Tracerlab, Inc., 2030 Wright Ave., Richmond 3, California.)

Check 2663 opposite last page.

### Resuscitator data

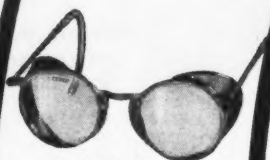
Resuscitator equipment for emergency service in case of carbon monoxide poisoning, heart failure, electric shock, asphyxia, etc. is described and illustrated in six-page bulletin. Bul NM-105R-15-657 — National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11, Illinois.

Check 2664 opposite last page.

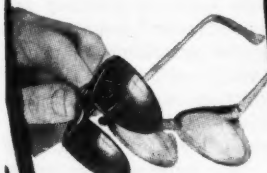
# CESCO...RIGHT—BEFORE YOUR EYES!



Comfort Bridge safety glasses



Sideshield Comfort Bridge safety glasses



LITE-KLIP safety glasses



Flexible plastic goggles

## New CESCO plastic frame safety glasses WITH ULTRA-MODERN LENS STYLE

• These new CESCO plastic frame safety glasses with the F7 shape lenses are not only superior in the safety glass field from the standpoint of fit and comfort, but many users prefer their shape and style to that of most personal glasses.

In addition to their fine appearance, these safety glasses have many outstanding features. Among them are:

**Frames are rigid** and will retain original shape without bowing

**Choice of 2 colors**—opaque slate (bluish gray) to eliminate light reflection, or translucent flesh

**Nosepads are broad bearing** to give comfortable distribution of weight

**Lenses are interchangeable**—the same lens fits either right or left side

**Available in three sizes**

**CHICAGO EYE SHIELD COMPANY • 2719 West Roscoe St., Chicago 18, Illinois**  
**OFFICES IN:** Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Cincinnati, Cleveland, Columbus, Dallas, Denver, Detroit, Houston, Kansas City, Knoxville, Little Rock, Los Angeles, Louisville, Mexico City, D.F., Milwaukee, Montreal, Orange, Peoria, Philadelphia, Pittsburgh, Salt Lake City, San Mateo, Spokane, St. Louis, St. Paul, Toledo, Tulsa, Clearwater

**ASK your CESCO Safety Equipment Distributor to show you the new modern plastic frame safety glasses with the F7 lens—and the many other safety glasses and goggles in the complete CESCO line**

# CESCO

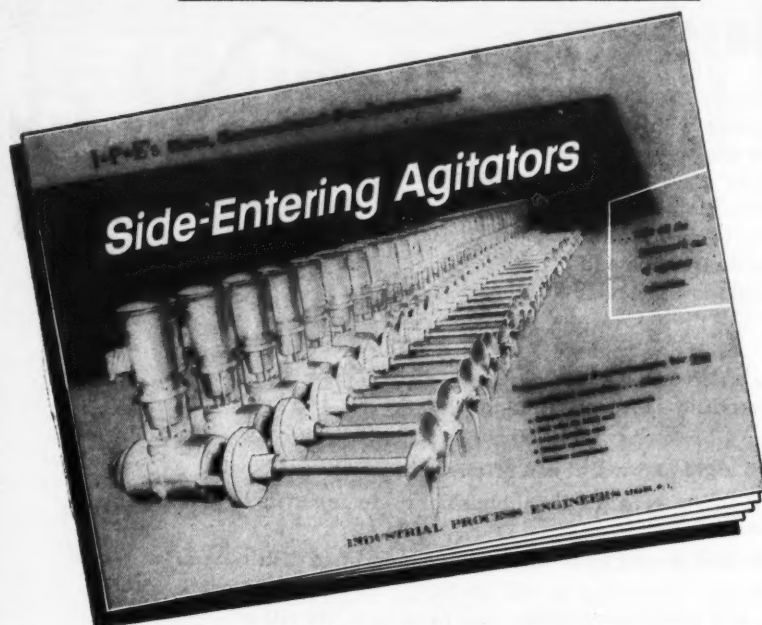


## FOR SAFETY

Check 2665 opposite last page.

# A new brochure you should have

*if you have any mixing  
requirements at all.*



- ★ Tells how to get guaranteed results, in your specific process or operation.
- ★ Shows how to save time and money, from selection to installation to operation.
- ★ Gives design and specification details of I\*P\*E's new Side-Entering Agitator.

Write for your copy today—



**INDUSTRIAL PROCESS ENGINEERS**

12 LISTER AVENUE • NEWARK 5, N. J.

Check 2666 opposite last page.



**PROCESSING  
EQUIPMENT**

To meet growing demand for finer and finer grinds, Witco Chemical Co. switched from standard impact mills to air-swept, self-classifying pulverizer — finds that . . .

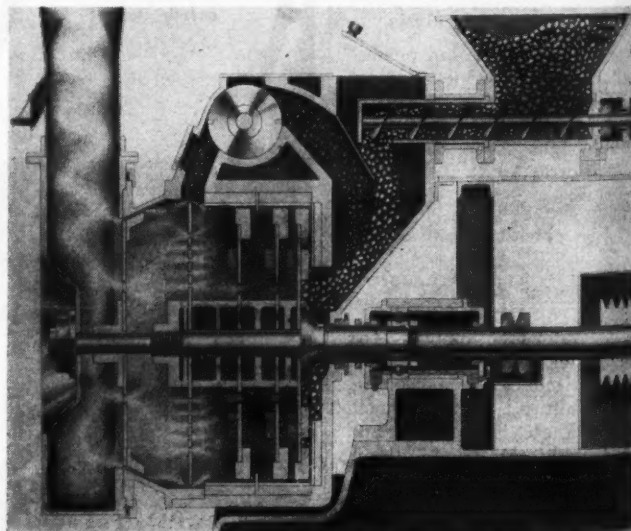
## superfine pulverizer maintains highest quality standards for stearates

**THEODORE W. WETT**, Assistant Editor  
With **LEONARD WOOD**, Plant Supt.  
Witco Chemical Co., Chicago, Ill.

**Problem:** Growing demand from users of metallic stearates for finer grinds and more stringent quality standards led Witco Chemical Co., to re-evaluate existing grinding facilities. Standard impact mills were not providing a product with sufficient particle distribution in the lower micron ranges to satisfy Witco's desire to supply customers with the maximum in product

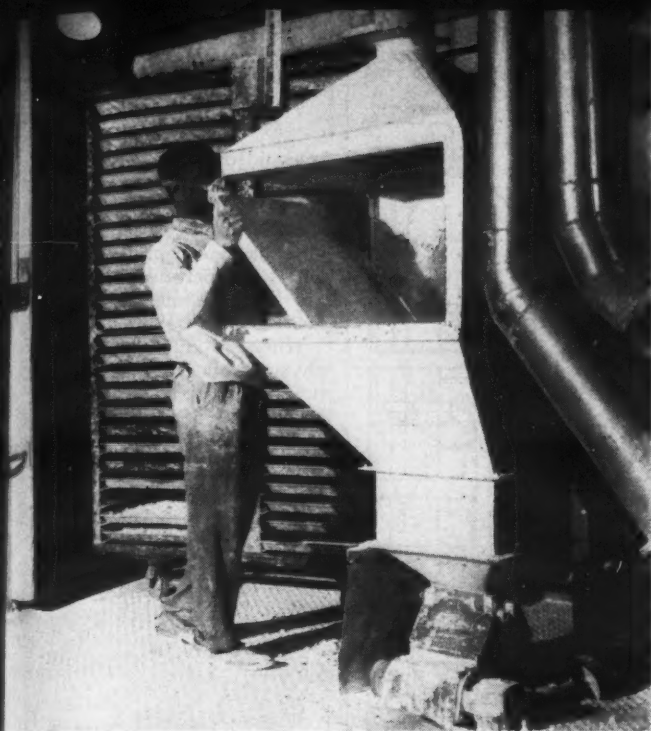
quality. Equipment was not flexible enough to permit custom handling of each product, and grind selection was limited.

Metallic stearates find use in paper to give water-repency; to thicken greases; as heat and light stabilizers in vinyl plastisols; as a flattening or thickening agent in paints, varnishes, and lacquers; and in lubricants. They are pre-



Pulverizer combines centrifugal air attrition and impact to give narrow distribution of fine particle size





Dried stearates are dumped from drying trays into pulverizer hopper. Unit is located below floor, handles 1000 lb/hr on average

pared as follows: A dilute soluble soap solution is prepared by reacting caustic soda with the selected fatty acid. A separately prepared salt solution of desired metal is then added to precipitate the metallic soap. Precipitate is separated by rotary vacuum filter and dried on plastic trays with forced-draft air and steam coils. Dried product is then ground to desired size and packaged. Fine particle size is an important factor in end-use application.

**Solution:** Late in 1955, Witco installed an air-swept, self-classifying pulverizer for

grinding metallic soaps. Unit uses centrifugal force and air current to grind by shear and impact, with simultaneous internal classification and recycle of oversize.

Material enters mill at a point near rotor shaft. High peripheral speeds, up to 24,000 fpm, set up strong centrifugal forces. Rotating discs with fixed beaters at perimeter, variable with mill size and requirements, are separated by rings or dams which create a classifying action. Fine particles are swept forward on air stream, coarser ones are retained and subjected to further reduction.

Besides classifying action, air causes impact and shear on particles between beaters and corrugated back plates and liners. Turbulent, high-velocity air forces also create attrition between particles. Further classifying action is performed by perforated mill plate and cone plate with attached "whizzer" blades near mill outlet.

**Results:** Witco is now able to obtain a finished product at rate of 1000 lb/hr average per machine with a narrow distribution of fine particle size. Heat degradation of somewhat heat sensitive stearates

**Typical  
particle size distribution<sup>1</sup>  
in a calcium stearate**

Microns	%
36.7	1.6
25-36	0.5
10-25	1.1
7-10	2.3
4.5-7	1.5
2.0-4.5	13.0
1.7-2.0	13.5
1.35-1.7	20.0
1.35	46.5

<sup>1</sup>Andreason pipette method

**SWECO introduces a complete new line of steam jet ejectors,** available in single and multiple stages and in a wide range of sizes and materials. Entirely new designs incorporate the most recent developments in the field—to meet the vacuum requirements of the power and process industries flexibly and efficiently.

Ejectors, the most widely used vacuum-producing devices, are particularly applicable where condensable vapors or corrosive substances must be condensed. SWECO's improved construction utilizes corrosion-resistant materials to protect the unit while in operation and to minimize rusting during shut-down. The units are generously designed, easy to service, with ample test connections for quick performance checks in the field.

SWECO Steam Jet Ejectors are available from 1" to 8" and larger, and from 1 to 6 stages. For extra flexibility, any number of units may be used in parallel. Various combinations of inter-condensers and after-condensers can be provided for individual requirements.

A new 8-page bulletin describes and illustrates design, construction, sizes, combinations and uses of SWECO Steam Jet Ejectors. It also includes a set of valuable Dalton's Law charts with instructions to determine the relationship between percent air in various air-water vapor mixtures vs temperature of the mixtures for various pressures. Write for your copy. It's Bulletin M-4-3.

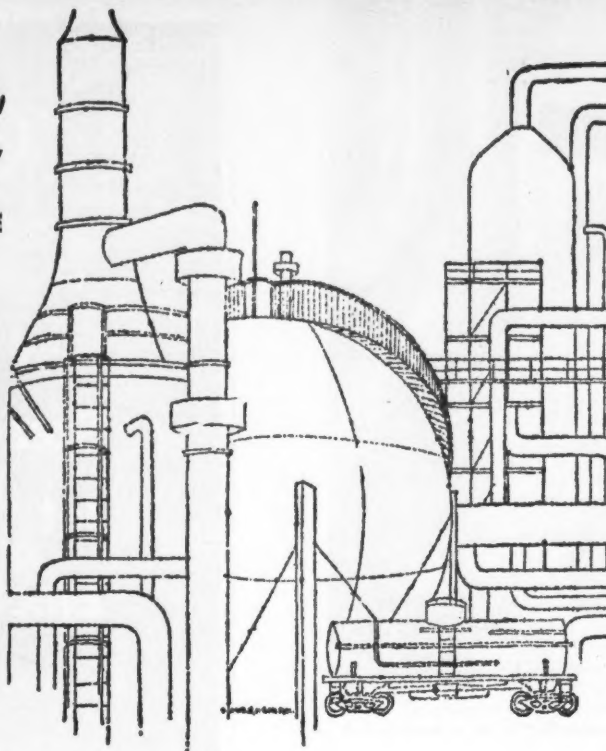
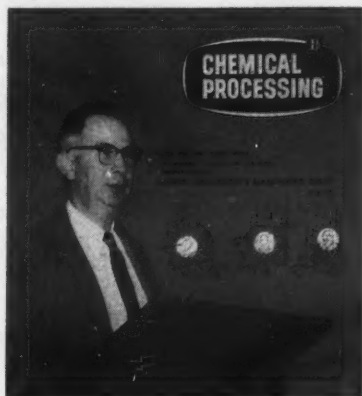
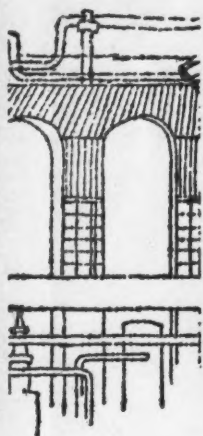
See SWECO equipment at the 26th Exposition of Chemical Industries, New York Coliseum, December 2-6, Booth 1307.

**Southwestern Engineering Company**  
4800 Santa Fe Avenue, Los Angeles 58, California  
LUdlow 3-6262 - Cable: SWECOLA  
ENGINEERS AND CONSTRUCTORS... MANUFACTURERS

Check 2667 opposite last page.



INTRODUCING THIS NEW  
"EXECUTIVE SIZE"  
OF CHEMICAL PROCESSING MAGAZINE



This issue of **CHEMICAL PROCESSING** is *different*. Lay this copy alongside an earlier issue (before July) of CP... compare them. Hold the new issue in your hands... slip it into your brief case. It "fits"... it invites easy reading... for busiest-of-all chemical executives.

**IT NAMED ITSELF  
"THE EXECUTIVE SIZE"...**

for the new format has been styled for today's busy executives... expanded main editorial sections covering subjects vital to the management team in chemical processing industries... prepared in the established Putman editorial style.

**AN EARLIER ORIGINAL  
DESIGN IMPROVES...**

Nineteen years ago Putman Publishing Company created the original design for business magazines, known as "King Size"... bringing heretofore

unknown visibility and greater effectiveness in editorial presentation (yes, for advertising, too). Scores of other magazines adopted this format, and use it today.

Now, the "Executive Size" brings you new advantages... while retaining the best of the old.

Turn to pages 58 and 59. Look at the unusually effective presentation of the editorial matter... the easy-to-read, easy-to-follow layout.

Leaf anywhere through the magazine... editorial material *everywhere*... front and back. No solid sections of advertising pages... newspaper-width editorial columns invite easy reading throughout.

We think you'll find the new "Executive Size" of **CHEMICAL PROCESSING** easier to read, more interesting. Don't you agree? We'll welcome your comments.

*All Putman magazines now appear in this new "Executive Size"... FOOD PROCESSING, FOOD BUSINESS, POWER INDUSTRY, as well as CHEMICAL PROCESSING.*

**PUTMAN PUBLISHING COMPANY**

111 E. DELAWARE PLACE • CHICAGO 11, ILLINOIS



"Executive Magazines for Industry"

**PROCESSING**

is avoided by proper selection of internal mill parts and air stream volume and temperature. Manufacturer has available jacketed units for use where temperature tolerances are acute. Either chilling or heating can be applied.

When product end-use or physical characteristics make it necessary to change desired grind size it can be done quickly and easily. Pulverizer's flexibility enables Witco to provide stearates in a number of different particle sizes as regular production.

(Superfine Pulverizer was supplied by Schutz-O'Neill Co., 343 Portland Ave., Minneapolis 15, Minnesota.)

Check 2668 opposite last page.

**Describes ripple trays**

Newly developed perforated ripple-type tray for distillation columns is detailed in four-page bulletin. How high tray efficiency is maintained over wide range of loadings is explained. Ripple Tray Bul — Stone & Webster Engineering Corp., 49 Federal St., Boston 7, Massachusetts.

Check 2669 opposite last page.

**New electronic device  
assures top efficiency  
in electro-precipitators**

Keeps optimum voltage on gas stream at all times

An electronic device is now available for Cottrell precipitators that continuously and automatically adjust the electrical voltage to meet the fluctuating characteristics of the incoming dust-laden gas stream.

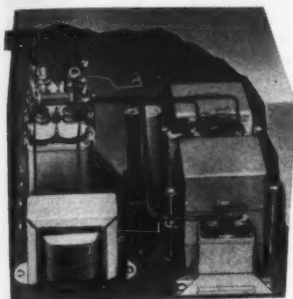
Up to now, this could be accomplished manually, but high labor costs and frequently inaccurate control made some form of automatic control essential. The device results in optimum precipitator operating efficiency at lowest overall cost.

The new "Transistomatic" control contains no tubes, relays, or moving parts. It re-

## PROCESSING

quires no maintenance, no parts replacement, and carries a life-time guarantee by the manufacturer. It is completely sealed so that it is unaffected by moisture, dust, or other environmental factors. Unit is compact, occupying only small space in precipitator's control panel.

Device uses sensing principle that integrates total surge current in relation to time.



Controller contains no tubes, relays, or moving parts. Unit is completely sealed, never requires maintenance

This provides a continuous method of evaluating rate of surge current — not the intermittent "step process" heretofore used in which sparks are counted over a fixed period of time — and results in an entirely new standard of continuous pin-point accuracy in controlling precipitator voltage.

(Transistomatic control was developed by Western Precipitation Corp., 1000 W. Ninth St., Los Angeles 54, Calif.)

Check 2670 opposite last page.

### Pulp processing

Processing equipment for pulp, paper, hard board, grain, starch, asbestos, chemicals, vegetable oils, and foods is shown in four-page condensed catalog. Equipment such as cleaners, digesters, double- and single-disc refiners, and hammer and nutrition mills are illustrated and described. Bul 57 — The Bauer Brothers Co., 1728 Sheridan Ave., Springfield, Ohio.

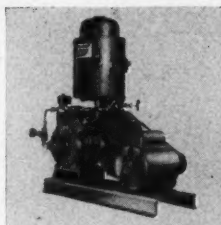
Check 2671 opposite last page.

# HIGH VACUUM HELPS YOU—

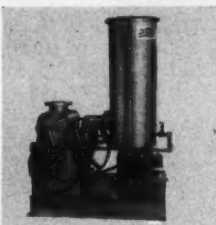
- ✓ develop hundreds of new products with controlled hybridizing of elements,
- ✓ improve present products through new purity in chemicals, metals, etc.
- ✓ process products more precisely, faster and cheaper through—

## Kinney®

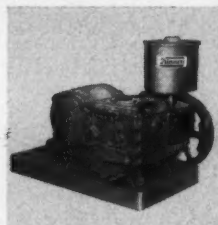
## HIGH VACUUM EQUIPMENT



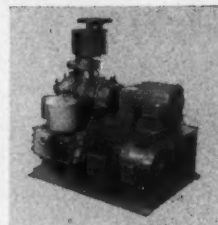
KS Series Single Stage Simplex Oil Sealed Mechanical Pumps—3 models with displacements of 13 to 46.8 cfm at rated speeds—ultimate pressures to 10 microns. (McLeod)



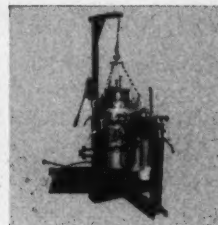
KD Series Single Stage Duplex Oil Sealed Mechanical Pumps—9 models with displacements from 30.4 to 780 cfm at rated speeds—ultimate pressures to 10 microns. (McLeod)



KC Series Compound Oil Sealed Mechanical Pumps—6 models with displacements of 2.0 to 46.0 cfm at rated speeds—ultimate pressures to 0.2 microns. (McLeod)



KMB Series Two-Stage Mechanical Booster Pumps—4 models with displacements of from 30 to 5000 cfm at rated speeds—ultimate pressures to 0.1 microns. (McLeod)



KINNEY High Vacuum Furnaces, from laboratory sizes for investigation of problems in refining, melting, pouring and sintering to full scale high production equipment.

### THE WORLD'S BROADEST SELECTION OF HIGH VACUUM PUMPS



Complete your file on new developments in Vacuum technology—Write for full information on the KINNEY Vacuum Equipment of interest to you—TODAY.

**KINNEY MFG. DIVISION**  
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THE NEW YORK AIR BRAKE COMPANY  
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Please send me full information on KINNEY High Vacuum Pumps.

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Check 2672 opposite last page.



## PROCESSING

**More uniform product, smaller amount of fines produced by crusher**

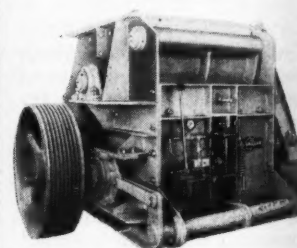
Single three-roll unit gives two-stage results

**Uses:** Crushing rock, ore, coal, and similar materials.

**Features:** Triple-roll unit provides two-stage crushing with only a single power unit. Crusher can reduce run-of-mine product to as small as  $\frac{1}{2}$ ". Design results in more uniform product with fewer fines.

**Description:** Crusher is composed of two elements—an 18"-diam single roll, crushing primary feed against a curved crushing plate; and two 18"-diam rolls performing the secondary motion.

Hydraulic system positions secondary crushing rolls to any desired opening up to 6", with roll openings indicated



Crusher can reduce run-of-mine product to as small as  $\frac{1}{2}$ "

by gage. System makes change accurately within minutes, even while crushing.

Adjustable relief valve in hydraulic system protects against damage to secondary crushing system from uncrushable materials. Primary system is protected from tramp iron damage by breaking blocks.

Crusher occupies small space, low head room, and requires only simple conveyor arrangements. Unit is made in four sizes, 18" roll diam by 24" roll width, 18x36", 18x48", and 18x60".

(Black-Diamond triple-roll crusher is product of McLanahan and Stone Corporation, Hollidaysburg, Pa.)

Check 2674 opposite last page.

## When the Pressure Is On . . .

. . . for more efficient processing equipment operating at higher pressures and temperatures, experienced fabricating skills are important. This pressure vessel in carbon steel, designed to withstand 300 psi at 270°, is one of many types of vessels Graver fabricates to customer requirements in conformance with the ASME Code. Eminently satisfactory performance and long-life is assured when Graver's century-aged skills are employed. When high pressures and temperatures are involved, it is a sound decision to discuss your requirements with Graver.

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*Building for the Future on  
a Century of Craftsmanship  
in Steels and Alloys*

**GRAVER TANK & MFG. CO., INC.**

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Check 2673 opposite last page.

CHEMICAL PROCESSING



## Leaders Discuss 1958

What business and technological developments will 1958 bring to the chemical processing industries?

What will be the trends?

These are some of the topics which industry leaders will discuss in next month's **CHEMICAL PROCESSING** feature,

### "The Leaders Speak"

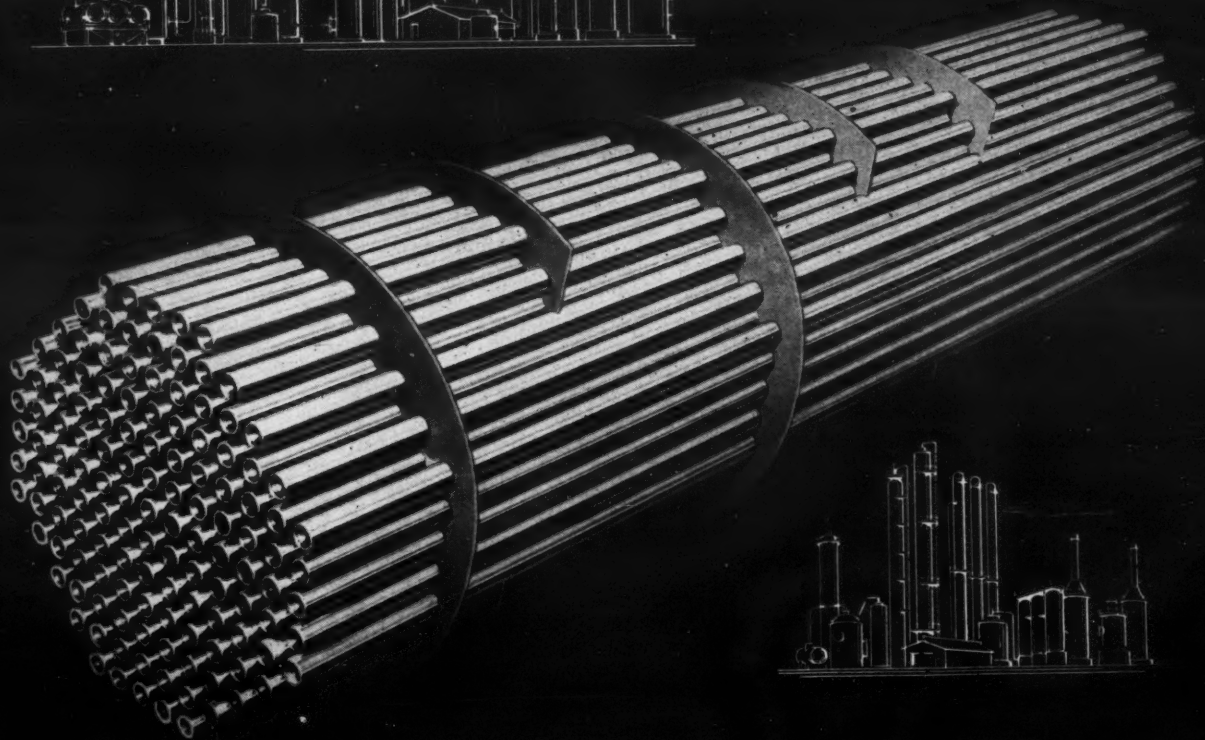
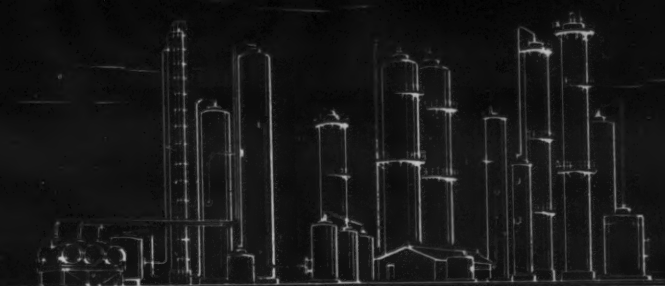
Comments from key men in the chemical, petroleum, petrochemical, paint, rubber, and other allied industries will be included in this regular annual feature.

SO . . .

if you're interested in learning what's in store for your particular industry or for the other industries that you serve, then you will not want to miss these analyses.

They will give you some insight into the predictions of 1958 trends.

For more information on product at right, specify 2675 see information request blank opposite last page.



YOU SAVE WHEN YOU SPECIFY

## B&W ERW Tubing For Heat Transfer Equipment

When you specify B&W Electric-Resistance-Welded Carbon Steel Tubing in your heat transfer equipment, you not only have lower original cost—you are assured of savings where they count—in operating costs. Its uniform wall thickness provides high heat transfer efficiency. And dimensional accuracy from tube to tube assures easier fitting into tube sheets with less time required for rolling-in operations.

Used in oil preheaters and heat exchangers at major refineries, B&W ERW Tubing is made to ASTM and ASME specifications. It must pass rigid inspection and testing standards in manufacture. Its value has been proved in such heat transfer applications as boilers, condensers, preheaters, economizers, evaporators, and refrigeration equipment.

A call to Mr. Tubes, your nearby B&W Tube representative, will bring you economical recommendations plus quick deliveries. Write for Bulletin 412. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-7008-PP2

Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels.



Water boxes fabricated by welding  $\frac{1}{4}$ " sheet of Anaconda Cupro Nickel, 10%-755, in the plant of The Youngstown Welding and Engineering Co., Youngstown, Ohio. The flanges and ribs are of steel. This company also fabricates pipe and fittings of Cupro Nickel, 10%, for salt-water service.

## Welded construction with Cupro Nickel sheet metal saves weight in water boxes for tough naval service

The marine condenser water boxes (shown above) were fabricated by welding Anaconda Cupro Nickel, 10%-755 sheet to save weight on an aircraft carrier. They do a job usually requiring heavy castings. And they can do it because Cupro Nickel, 10%-755 has the strength and resiliency to withstand surges of large volumes of water used in this service—combined with high resistance to corrosion by sea water, hot or cold. Cupro Nickel, 10%-755 can be welded with seams as strong as the parent metal.

This low-nickel alloy, originally developed in the laboratories of The American Brass Company for condenser tubes handling salt water, is rapidly finding many other uses in industry. Its unique combination of properties makes it highly desirable for the fabrication of high-temperature water heaters, for example, and in many types of pressure vessels.

Wherever you need a combination of good weld-

ability, high resistance to corrosion and high strength, consider Anaconda Cupro Nickel, 10%-755. Where even greater strength and corrosion-resistance are required, Anaconda Cupro Nickel, 30%-702 sheet, plate and tube are available.

**TECHNICAL ASSISTANCE.** Whatever your problem, the Technical Department of The American Brass Company will gladly help in the selection of the nonferrous alloy most practical for you. Write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

5788A

# ANACONDA®

**COPPER AND COPPER ALLOYS**

Made by The American Brass Company

Check 2676 opposite last page.

## PROCESSING

### Entrainment separator can withstand pressures up to 15,000 psi

Has no moving parts, filters, or mesh screens

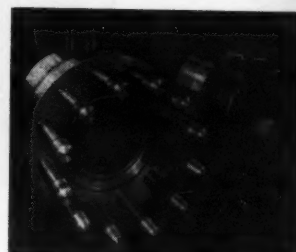
**Uses:** Removing entrainment from high-pressure air, steam, and process vapor and gas lines.

**Features:** Entrainment separators are designed to withstand pressures up to 15,000 psi.

**Description:** Units are built for use in high-pressure applications in chemical, petroleum, synthesis gas, petrochemical, and other high-pressure industries.

Pressure parts are made of alloy steel. Special gaskets and pipeline connections are used. Purifier uses no moving parts, filters, or mesh screens of any type.

Unit operates on patented two-stage principle of separation. In first stage, impingement against a baffle removes larger droplets. In second



Pressure parts are made of special alloy steel

stage, fine mist is removed by using centrifugal scrubbing action through a specially designed separation element.

In each stage the air or vapor stream as well as the separated liquid is continuously guided for maximum efficiency. These factors permit the design of a very small unit without danger of carry-over under normal operating conditions. Largest unit made to date is 6" diam.

(High pressure HI-eF purifiers are product of High Pressure Vessel Section, Purifier Division, The V. D. Anderson Company, 1935 West 96th St., Cleveland 2, Ohio.)

Check 2677 opposite last page.

CHEMICAL PROCESSING

## YOUR OPINIONS

and  
comments  
on the significant  
subjects pre-  
sented in each  
month's  
CHEMICAL  
PROCESSING  
are important!  
We welcome  
your letters  
expressing  
your views.

In this way  
others will have  
the opportunity  
of hearing  
your side.

### Perhaps you agree

with what  
has been said  
in these articles.

### Maybe you don't

You might even  
have a thought  
or angle which  
wasn't expressed.

If so,  
why not let us  
and others learn  
your ideas?

Suitable letters  
will be  
published in  
our regular  
Letters  
from Readers  
column, (see  
page 12 in  
this issue).

Address . . .  
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For  
more information  
on product at  
right, specify 2678  
see information  
request blank  
opposite last page.



# NEW TWIN-LOBE Positive Displacement PUMP\*



Manton-Gaulin presents a completely new concept  
in rotary positive displacement pumping —  
The Gaulin Twin-Lobe® design.

The two big features are simplicity and performance  
— results of a radically new "Twin-Lobe" pumping  
principle. Look at these advantages:

- Simple construction, only three moving parts.
- High mechanical efficiency, lower horsepower required.
- High vacuum, self-priming. Efficient enough to move volatile gases or extremely viscous liquids.
- Wide range of uses — handles corrosive and abrasive materials.
- Special alloys used throughout for long wear, precision fit.

Send for New  
G. T. A./TLP-57  
Bulletin!

Complete description,  
data sheets and application  
guide are now available.  
Find out how the new  
Twin-Lobe pump can save  
money, improve quality.

### One Basic Design good for many uses

Liquids, heavy slurries, pastes,  
soft food solids, emulsions, gases,  
and light non-lubricating liquids

\*Pat. Pending

### Capacity and size range

Three models now available.  
Capacities: 0-56 gpm; Pressures: 0-200 psi.



55 GARDEN ST.

EVERETT 49, MASS.

World's largest manufacturers of  
stainless steel reciprocating, rotary, pressure  
exchange pumps, dispersers, homogenizers and  
colloid mills.



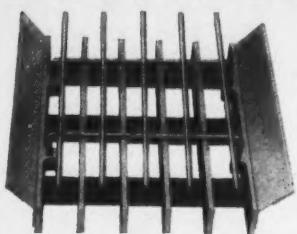
## What dry materials have you to purify?

You undoubtedly work with dry materials which require separating into various components. If so, you can probably get some interesting and useful information from us on the subject.

We make three types of separating equipment.

**Specific Gravity Separators.** Through a combination of mechanical and pneumatic forces, these machines classify materials according to apparent density.

**Mechanical Graders.** By means of screens, these machines separate



This is the unique Bauer Magnetic Grate. Bulletin P-3 describes it and our other types of permanent magnetic separators.

materials according to sizes of pieces or particles. Exhaust systems are often incorporated to remove fines, dust, etc.

**Magnetic Separators.** These are principally used for the removal of tramp iron. We furnish them in chute, grate, lifting, and pulley types.

If you have a knotty separating problem, we may have the answer. Just give us an idea of the job you want done.

*Bauer*

**THE BAUER BROS. CO.**  
1728 Sheridan Ave. • Springfield, Ohio

Check 2679 opposite last page.

**DAVENPORT**

PRESSING — DRYING  
and  
COOLING Equipment

Continuous DeWatering  
Presses

ROTARY DRYERS  
Steam Tube, Hot Air  
and Direct Fire

Atmospheric  
DRUM DRYERS

ROTARY COOLERS  
Water and Air

**DAVENPORT MACHINE AND**  
*Foundry Company*  
Davenport, Iowa, U.S.A.

Check 2680 opposite last page.

**BOOTH**  
**818**

EXPOSITION  
of  
CHEMICAL  
INDUSTRIES

New York  
December 2-6, 1957

If you are unable to attend the show, let us send you our catalog C

## PROCESSING

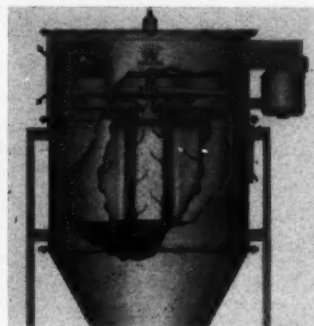
**No shut-down necessary for rapping, cleaning dust collector**

Product discharged continuously by rotary valve

**Uses:** Unit is especially suited for separating product from airstream in pneumatic conveying systems.

**Features:** Dust collector is designed for automatic, continuous operation. No shut-down is necessary for rapping or cleaning. Product discharge is handled automatically and continuously by means of rotary valve. Unit is 99.99% efficient.

**Description:** Modified unit uses Hersey principle of high-velocity reverse-air cleaning but differs from usual Hersey principle in that dust is de-



Dust is deposited on outside of filter sleeves in dust collector

posited on outside of filter sleeves. An inner liner surrounds filter sleeves and the dust-laden air travels in a cyclonic path separating heavy dust particles before air carrying fines enters filter chamber.

All moving parts are located on clean air side, assuring longer life for mechanical assembly of filter.

Felted filter is the media used for filter sleeves. This particular media was selected because of its ability to filter sub-micron particles and handle high volume of dust laden air per sq ft of media.

(Modified Day "RJ" dust filter is manufactured by The Day Sales Company, 810 Third Avenue, N. E., Minneapolis 13, Minnesota.)

Check 2680A opp. last page.

**You Should USE...**



**to get Clean Separation of vapor from liquid in your process equipment!**

## WHY?

To improve overhead product quality, or to eliminate liquid overhead losses, and permit increased throughput rates.

## WHERE?

**YORKMESH DEMISTERS**

improve the performance of:

Vacuum Towers • Distillation Equipment • Gas Absorbers • Scrubbers • Evaporators • Separators, Knock-Out, or Steam Drums

## HOW TO ORDER

Send details on type of process vessel or operation, vapor flow rate, pressure, temperature, and density or molecular weight; approximate amount of entrained liquid, viscosity, and specific gravity. Furnish drawing or sketch, if possible.

**YORK**

**OTTO H. YORK CO., INC.**  
6 CENTRAL AVE. • WEST ORANGE, N. J.

Check 2681 opposite last page.

CHEMICAL PROCESSING

## TRUFIN TYPE L/C IS IDEAL TUBE FOR AIR COOLERS

Wolverine Trufin Type L/C is a specialized tube developed by Wolverine Tube after years of research. It is particularly effective in such applications as air cooled gas coolers, air cooled water coolers, air cooled hydrocarbon condensers and air cooled steam condensers—to name but a few.

Trufin L/C's construction features an outer tube of high-finned aluminum tube mechanically bonded to an inner liner of such metals as copper, Admiralty, 85-15 red brass, low carbon welded steel, 90-10 and 70-30 cupro nickel—among others.

Wolverine Trufin Type L/C is available in standard sizes and fin spacings. Its fins—like those of all Trufin types—are an integral part of the tube and are unaffected by vibration, thermal shock or temperature variations. Liners can be made to standard condenser tube specifications and tube ends can be furnished with full finned ends or fins stripped to liner size. Stripped ends are provided to permit easy installation into headers for rolling-in or brazing operations.

## TUBING PROBLEMS SOLVED BY F. E. S.

For the convenience of its customers, Wolverine Tube maintains a Field Engineering Service staffed with highly trained tubing technicians.

In addition to their own specialized training these men are backed by the experience and knowledge gained by Wolverine during its years of tubing leadership.

Members of the Field Engineering Service are available at all times to help solve problems in design, corrosion, tubing selection—or what have you. Next time you have a problem ask for a Wolverine Field Service Engineer—there is no obligation.

## SEND FOR FREE BOOK

Valuable information concerning the various types of Wolverine Trufin available—their construction features, alloys and size ranges as well as the applications where each can be used to full advantage is contained in the Trufin Catalog. Write—TODAY for FREE copy.



## Use Spreads:

# Heat Transfer Revolution caused by Wolverine Trufin®

BY ERNEST DODD

Nowadays being called a revolutionary is almost fighting talk. Except—that is—when the term is used to describe Wolverine Trufin—the integrally finned condenser tube. Trufin is responsible for the technical revolution now underway in the field of heat transfer operations.

From coast to coast and from the Canadian border to the Rio Grande, more and more refineries and processing plants—as well as original equipment manufacturers—are specifying Wolverine Trufin, in its various forms, for use in both new and existing heat exchangers and condensers.

An excellent example of this is to be found in the air-cooled heat exchangers manufactured for major refineries by one of the nation's leading fabricating companies. This company's air-cooled units are designed around Wolverine Trufin Type L/C—a two-purpose tubing composed of an outer tube of high-finned lightweight aluminum mechanically bonded to a liner tube of any desired metal.

By using Trufin Type L/C, the fabricating engineers kill two birds with one stone . . . step up BTU transfer . . . and combat corrosion by specifying an inner liner of any needed metal or alloy.

Still another well-known fabricating company recently completed an

order in which the units were also designed around Wolverine Trufin. This time, however, the tubing used was Wolverine Trufin Type S/T (for shell and tube use) and the exchangers were fuel oil heaters designed to speed up oil flow at a large tank farm. In this case, with steam in the tubes and fuel oil in the shell, the oil is in at 100°F and out at 125°F—for a completely successful operation.

And so from here, there, and everywhere around the country—come stories of how Wolverine Trufin—and its integral fins helps engineers improve heat transfer performance. If your company hasn't as yet tried this outstanding tube why not use it next time you retube existing equipment or design new units.

CALUMET & HECLA, INC.

CALUMET DIVISION  
WOLVERINE TUBE DIVISION  
FOREST INDUSTRIES DIVISION  
CALUMET & HECLA  
OF CANADA LIMITED  
CANADA VULCANIZER AND  
EQUIPMENT COMPANY LIMITED



## WOLVERINE TUBE

Division of Calumet & Hecla, Inc.

17234 SOUTHFIELD ROAD • ALLEN PARK, MICHIGAN

Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN, AND DECATUR, ALABAMA.  
SALES OFFICES IN PRINCIPAL CITIES.

EXPORT DEPARTMENT, 13 EAST 40TH STREET, NEW YORK 16, NEW YORK

Wolverine Trufin is available in Canada through the Unifin Tube Co., London, Ontario.

# TUBULAR TIME SAVER



BUY WOLVERINE TUBE—IT'S MADE IN AMERICA

CALUMET & HECLA, INC.  
CALUMET DIVISION  
WOLVERINE TUBE DIVISION  
FOREST INDUSTRIES DIVISION  
CALUMET & HECLA  
OF CANADA LIMITED  
CANADA VULCANIZER AND  
EQUIPMENT COMPANY LIMITED



**WOLVERINE TUBE**

Division of Calumet & Hecla, Inc.

17234 SOUTHFIELD ROAD • ALLEN PARK, MICHIGAN

Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN, AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES.

EXPORT DEPT., 13 E. 40TH ST., NEW YORK 18, N.Y.

Saving time is important—directly reflected in both cost and financial earnings.

You can save time—lots of it—using prefabricated Wolverine U-Bend condenser tubes in roll-formed (Wolverine Tube) prime surface form.

Wolverine bends condenser tubes to your specifications—ships them in disposable box-type units in the exact order of installation—ready for direct insertion into your heat exchanger or condenser.

In addition to assembly time, it eliminates the transportation and handling headaches when dealing with tubes over 10 feet long. One tube sheet eliminated and floating problems are reduced. Rolling operations are cut in half.

Wolverine prime surface tubes are available in a wide range of sizes and alloys in copper, copper-base alloys and aluminum. Capacity boosting U-Bends are available in copper, copper-base alloys, aluminum and electric-welded steel. Complete information is contained in Wolverine's Condenser Tube Catalog. Write today.



## PROCESSING

### Fused-edge filter units made from Vinyon, Dynel fibers

Units are lightweight, sturdy,  
and corrosion resistant

A fabric-type filter element has been patented having stiff fused-edge frame and body impervious to air and solids. Units are lightweight, easy to carry, and show marked resistance to corrosion.

Filters are chemically, electrically, and biologically stable, have an ample flow rate, and may readily be formed into a variety of shapes. They are reported to be more economical to produce than metallic units and may be constructed to operate with optimum ease of cake removal.

The fused-edge filter leaf may be prepared from a blend of Vinyon and Dynel fibers for most general applications. Blend of other acrylic and polyethylene fibers may also be used for applications up to 240°F.

According to patent, carded batt is compressed between protective sheets in platen press. Any desired surface pattern may be imparted to the sheets. For example, one surface may be embossed or roughened, and the other surface made paper-smooth.

Resulting sheet has air permeability of about 1-3 cfm per sq ft for air pressure corresponding to ½" water. Density of sheet may be varied depending upon filtration application.

Final assembly consists of a number of sheets fused together along the edges to form an enclosure having stiff, impervious frame and liquid, permeable body. Outer sheets of assembly contain corrugated plastic separator which acts as drainage member for the filtered effluent.

(Fused-edge filter unit was developed by American Felt Company, Glenville, Conn.)

Check 2682 opposite last page.

For more information on product at left, specify 2683 . . . see information request blank opposite last page.

## Can <sup>specialized</sup> business publication advertising actually sell?

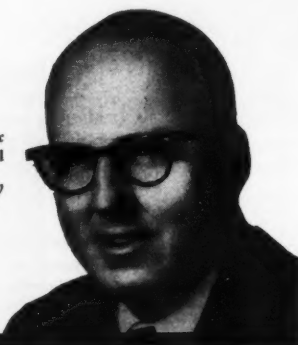
By reputation, salesmen are reluctant to credit anything but their own selling efforts for getting names on the dotted line.

Actually, it's quite a different story. The most successful salesmen will tell you two important things about selling. 1. That the selling process is largely a matter of communicating ideas. 2. And that specialized business publication advertising can help importantly to register information with prospects.

Of course each salesman will express this in his own way . . . but they all agree that selling would be far more difficult without the advertising that appears in the industrial, trade, and professional publications that serve the specialized markets to which they sell.

Here, for instance, is what a salesman has to say about this kind of advertising:

William W. Cox  
AMP, Incorporated  
sells to industry



### Says Mr. Cox:

"The quickest way we can introduce a product is by introducing it through advertising in business papers. That way we get it around faster than we can by word of mouth alone. On occasion my home office has inquiries out to me before I can get to the customer or prospect to introduce a new product. They've already seen it in a trade magazine.

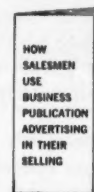
"It's interesting to note that within the last two weeks I received a survey which shows about 80% of the new customers we get on our books come through our trade publication advertising. Of course, our company is only 15 years old and we have grown from what you might say, *nothing*, to the biggest in our business. Certainly a lot of that has come from our advertising campaigns. Our name is known throughout the world right now, purely because of our advertising program. When I go to a prospect now, they know my company, they know my product . . . it makes

my job easier, and opens doors when I have to make cold calls."

**Ask your own salesmen** what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

### How salesmen use their companies' advertising to get more business

Here's a useful and effective package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet entitled, "How Salesmen Use Advertising in Their Selling," which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' advertising.



You'll find represented many interesting variations in how they do this. Some are very ingenious; all are effective. You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods.

The coupon is for your convenience in sending for your free copy. Then, if you decide you want to provide your salesmen with additional copies, they are available from NBP Headquarters in Washington, at twenty-five cents each. Or if you choose you can reprint the material yourself and distribute it as widely as you please. But first, send for your free copy.

NATIONAL BUSINESS PUBLICATIONS, INC.  
Department 4D  
1413 K Street, N. W.  
Washington 5, D. C.      STerling 3-7533

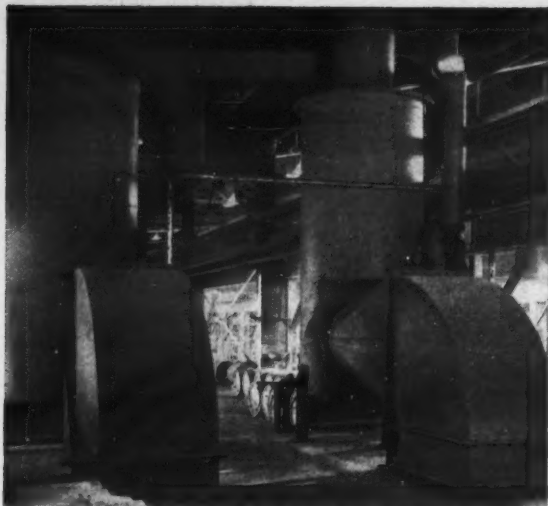
Please send me a free copy of the NBP booklet  
"How Salesmen Use Advertising in Their Selling."

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Street Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

### National Business Publications, Inc.



... each of which serves a specialized market in a specific industry, trade or profession.



Fume Scrubbers (cyclonic type) for use with sulphuric acid fumes.

## LET A HEIL CPE\* EXPERT HELP WITH YOUR FUME SCRUBBER PLANS

*Will a fume washer pay off for you, by increasing the life of your buildings and equipment, bettering your community relations? If so, should it be steel, lined steel, or solid plastic? How big should it be? How much water will it take? What kinds of hoods, ducts, blowers will work best with it?*

Heil Chemical-Proof Equipment\* specialists will help you get straight answers to these questions. Heil men offer unbiased advice, because Heil builds fume scrubbers in *all* practical materials, of both wet cyclone and packed types, in a wide range of capacities from 1000 CFM up. Heil is in a position to recommend the best for your needs.

Heil's field is *\*chemical proof equipment* of all kinds, including the hoods, ducts, blowers, stacks you will need with your scrubber. Take advantage of this broad experience developed from 28 years of specialization, and the engineering refinements it brings. Write today for bulletins on Heil Fume Scrubbers.

**HEILASTIC LININGS:** Rubber, Neoprene, Vinyl PVC, Plastic

**METAL FABRICATION:** Lead, Alloys, Steel Plate  
Heil also produces: Tanks, Heat Exchangers, Lined Steel and Solid Plastic Fans

One Source — One Responsibility



### HEIL PROCESS EQUIPMENT

CORPORATION

12901 Elmwood Ave. • Cleveland 11, Ohio

Check 2684 opposite last page.

## cp FOR THE LABORATORY

High-energy fuels research at Olin Mathieson involves chemical reaction of air-sensitive gases under high-pressure . . .

## bench-scale reactions to 10,000 psig using micro valves

**THEODORE W. WETT**, Assistant Editor

With **DRS. NEIL C. GOODSPEED**

and **J. S. ROSCOE**, Group Leaders

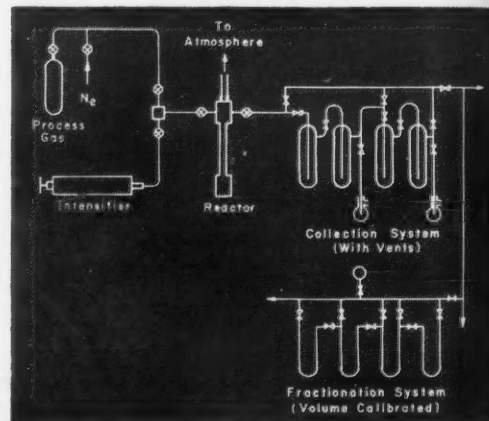
High Energy Fuels Organization, Research Dept.  
Olin Mathieson Chemical Corp., Niagara Falls, N.Y.

**Problem:** Experimenting at pressures over range from  $10^{-4}$  mm to 10,000 psig and higher is not only difficult — but can also be hazardous. High-energy fuels research, at Olin Mathieson Chemical Corp.'s Niagara Falls, N. Y. laboratory,

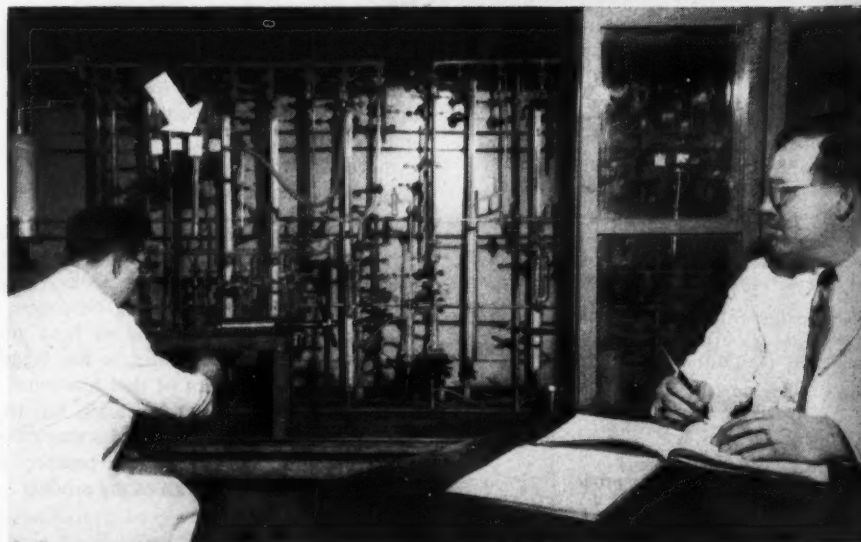
involves bench-scale air-sensitive, vapor-phase, vapor-liquid-phase, and vapor-solid-phase reactions.

Although most details of this installation are secret, some information can be told. It is desired to conduct these particular reactions in an open laboratory without involving expensive heavy-pressure equipment, or using sand-bag barriers or high-pressure booths. Also, experimental conditions must be reproducible within precise limits on quantities of material ranging from 0.5 to 5.0 grams.

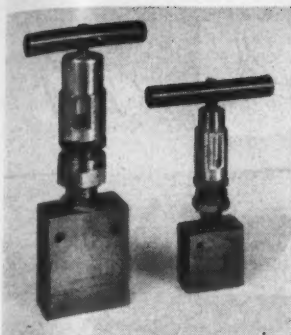
Schematic of miniature high-pressure system for conducting reactions of sensitive gases under high pressure



Drs. Neil C. Goodspeed (right) and J. S. Roscoe, group leaders of Olin Mathieson's High Energy Fuels Organization's Research and Development Division performing high-pressure experiment. Note high-pressure micro valves and vessel (arrow)







Micro valves have micrometer stem to permit accurate control of flow

**Solution:** Setup for high-pressure research was made using micro high-pressure vessels and micro valves. Valves have micrometer stem which permits accurate control of flow. One complete turn of handle opens valve 0.015", and setting can be read and recorded directly from stem.

Reaction vessel is loaded with air-sensitive reactants either in a dry box in an atmosphere of nitrogen or directly from a vacuum line by condensation. Where needed, an intensifier boosts line pressure to desired level. Resulting products of reaction are exhausted through a collection and fractionation system to determine results.

**Results:** Micro valve and components have been successfully employed on bench-scale operations handling quantities and pressures required . . . (0.05 to 5.0 grams and  $10^{-4}$  mm to 10,000 psig) . . . with an accountability of 98%. Only safety precautions necessary are a  $\frac{1}{4}$ " steel plate shield and safety goggles. With combination of high-pressure and vacuum techniques, setup has satisfactorily produced and reproduced, within required limits, all desired reaction conditions without involving expensive high-pressure equipment.

Results obtained in bench scale work have permitted Olin Mathieson to successfully scale up operations on high energy fuels.

(Micro high-pressure valves and vessels are products of High Pressure Equipment Co., Erie, Pennsylvania.)

Check 2685 opposite last page.



**FLOW CONTROL** is possible within wide limits, simply by changing feeder's amplitude of vibration.

As filled capsules are inspected at Abbott Laboratories, North Chicago, Illinois, the girl suits the speed of the Jeffrey feeder to her requirements with the hand rheostat.

## A way to do what "can't" be done... **JEFFREY** Vibrating Feeders

Jobs once considered too costly, too hazardous, or just plain impossible are being done with Jeffrey electric vibrating feeders . . . handling a tremendous variety of materials, densities from 4 to 400 pounds per cubic foot, one micron in size to four-foot cubes, a few ounces to 2,000 tons per hour.

With Jeffrey feeders, the operator has instant and absolute control over the flow of material. This control may be manual or automatic, depending upon equipment that follows, to insure optimum loading. Thus a plant and its workers can produce at top efficiency.

Jeffrey engineers are expert in applying vibrating equipment to all types of processes, and are available to help solve your feeding and conveying problems. Catalog 870 describes these feeders. The Jeffrey Manufacturing Co., 853 North Fourth St., Columbus 16, Ohio.

CONVEYING • PROCESSING • MINING EQUIPMENT... TRANSMISSION  
MACHINERY... CONTRACT MANUFACTURING



Check 2686 opposite last page.



# Greatest Improvement in Fume Hood Air Flow Control in 20 Years!

MINEOLA, N. Y. — Laboratory Furniture Co., Inc., Mineola, L.I., N.Y., announces its revolutionary new Remote Control for Fume Hoods by which air flow for fume exhaust can now be changed during the operation of the fume hood, and with the safety sash open or closed. Described as the "SAFE 'n EASY" Remote Control, this new exclusive device is operated by a handle, located on the outside control panel, which the chemist turns, right or left, to change the air flow.

apparatus, crawl inside the hood, reach into the rear to adjust baffles manually, and then replace the apparatus. This procedure can often take as much as an hour, plus the hazards of broken instruments and toxic fumes. Laboratory Furniture's "SAFE 'n EASY" way regulates the air flow with one simple motion outside the fume hood, saving valuable experiment time and preventing possible losses in material.

**STEELAB'S NEW  
SAFE 'n EASY  
WAY!**

**changes air flow  
by remote control\*  
during fume hood operation  
with sash open or closed**

**ANOTHER  
STEELAB  
EXCLUSIVE**

\* Patent No. 2779265  
January 29, 1957

Famous for many firsts in the industry, Laboratory Furniture's newest improvement for fume hoods, the SAFE 'n EASY way, provides the perfect answer to an old problem. Now, with one simple motion, you can move the baffle by remote control and change the Air Flow inside the operating fume hood... without removing the apparatus, and with the sash open or closed. An exclusive STEELAB and WOODLAB feature!

**WRITE OR CALL TODAY FOR  
THESE VALUABLE PLANNING AIDS  
They're FREE!**



**LABORATORY  
FURNITURE  
COMPANY INC.**

"STEELAB," Revised Edition.  
Hundreds of ideas for  
laboratory furniture layouts.

"FUME HOODS" No. 54H.  
Most complete fume control  
prospects in the industry.

Over 35 Years of Specialized Service to Laboratories  
MINEOLA, LONG ISLAND, NEW YORK • PHONE: PIONEER 2-3600

Check 2687 opposite last page.

## LABORATORY

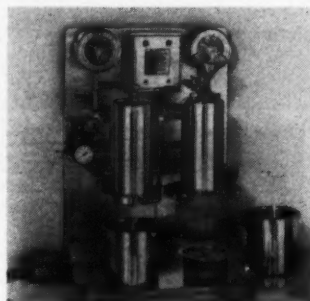
**Allows high-pressure,  
rapid filtration of  
large volumes**

**Converts to ultra-filter with  
cellophane filter**

**Uses:** High-speed filtration of large volumes of either light or heavy precipitates. Should be a valuable tool for handling filtration problems involving particles of visible size to sub-micron range.

**Features:** Automatic laboratory filter will rapidly filter large volumes in minutes, using positive air pressure of 50 to 125 psi.

**Description:** Originally developed for preparation of biological material for clinical assay, automatic filter is adaptable to general laboratory use.



Automatic high-speed filter will process two volumes independently, yet simultaneously

Unit consists of two independent filters mounted on a common stand, operated from a common air source. Two tests may thus be run simultaneously.

Filter is operated by placing filter medium, paper, membrane, other material, on stainless steel sintered plate. Assembly is then placed beneath tank holding sample. Air pressure forces sample through filter medium.

Unit has positive pressure control from 0 to 125 psi and will handle up to 3.5 liters. Made of stainless steel.

(Automatic speed filter is product of Scientific Products, Div. of American Hospital Supply Corp., 2020 Ridge Ave., Evanston, Illinois.)

Check 2688 opposite last page.



**PLATINUM**  
LABORATORY WARE FOR  
SCIENCE AND INDUSTRY



Whenever there is a requirement for platinum laboratory ware and apparatus, look to APW for both quality and prompt service. We manufacture an exceptionally wide range of platinum equipment for industrial, analytical and micro analytical use, as well as special process equipment made to your specifications.

**PRECIOUS METAL RECOVERY SERVICE**  
Here, modern APW facilities for the recovery of platinum and other precious metals from scrap and spent catalyst, assure prompt recovery and highest prices.

**SEND FOR FOLDER  
"PLATINUM, GOLD AND  
SILVER FOR SCIENCE,  
INDUSTRY AND THE ARTS"**



**THE AMERICAN PLATINUM WORKS**  
231 NEW JERSEY AVE. • NEWARK 3, N. J.

PRECIOUS METALS SINCE 1875

ENGELHARD INDUSTRIES

Check 2689 opposite last page.

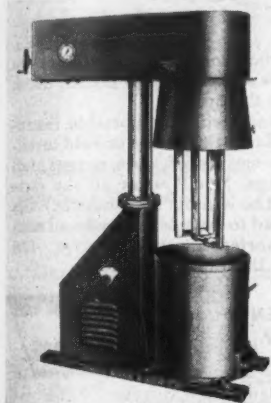
CHEMICAL PROCESSING

**Planetary can mixer  
has wide range  
of speeds**

Intensive double mixing in-  
creases efficiency

Uses: Mixing paste mate-  
rials.

Features: Unit has double  
planetary mixing action to in-  
crease mixing efficiency and  
reduce mixing time.



Paste mixer uses double plane-  
tary mixing action

**Description:** Each stirrer re-  
volves on its own axis, while  
both are revolved at a slightly  
slower speed around can. Close  
clearance between stirrers  
and can, and stirrers  
themselves, produce 12 points  
of compression and shearing  
action during each revolution.  
Units have hydraulic vertical  
lift. Can is completely en-  
closed during mixing. Sizes  
available are from 1 to 150  
gallons working capacities.

(No. 130CDM mixer is product  
of Charles Ross & Son Com-  
pany, 148 Classon Ave.,  
Brooklyn 5, N.Y.)

Check 2690 opposite last page.

**Moisture, density gage**

Bulletin of eight pages pre-  
sents application and opera-  
tion information, as well as  
specifications, on moisture and  
density probe. "d/M-Gauge"  
bul — Nuclear-Chicago Cor-  
poration, 223 West Erie Street,  
Chicago 10, Ill.

Check 2691 opposite last page.



## Building Water Treatment Systems is a man-size job!

Having been in the water conditioning business for nearly fifty years, we know that *every* water treatment job is a challenge. In this business, you can't send a boy to do a man's work.

Since 1908, Elgin has been designing, building and installing water conditioning equipment for thousands of purposes in hundreds of industries, institutions, municipalities and commercial establishments. Naturally, during that time, we've built up a backlog of experience and water engineering skill second to none. As a result, the name *Elgin* has become synony-

mous with superiority in the field of water condition-  
ing — whether softening, dealkalizing, demineraliz-  
ing, deaeration, degasification, chemical treatment.

Elgin makes it a policy to meet *every* water treat-  
ment problem with concentrated attention. You can  
feel sure — when you bring your problem to us —  
that all the experience and knowledge at our com-  
mand will be at your disposal. Talk over your water  
treatment problems with your Elgin representative.  
Or write us direct. We can help you!

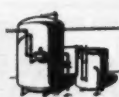


### ELGIN SOFTENER CORPORATION

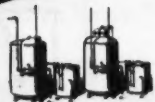
180 No. Grove Avenue, Elgin, Illinois

Representatives in Principal Cities

In Canada: G. F. Sterne & Sons Ltd., Brantford



SOFTENERS



ION EXCHANGERS



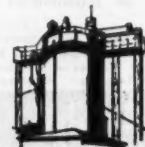
FILTERS



DEIONIZERS



DEALKALIZERS



LIME COAGULATORS



DEGASIFIERS



DEAERATING HEATERS

Check 2692 opposite last page.



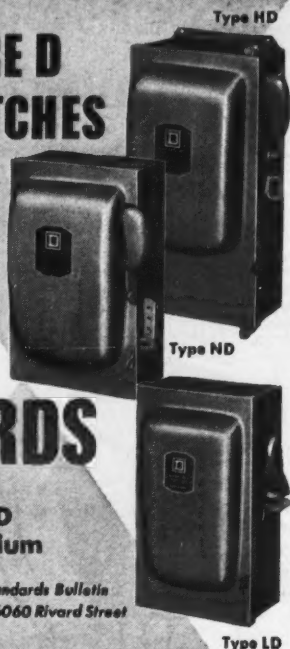
## GET SQUARE D SAFETY SWITCHES

and benefit from the

## NEW NEMA STANDARDS

Types HD, ND, LD  
at no cost premium

Write for New NEMA Standards Bulletin  
Address Square D Company, 6060 Rivard Street  
Detroit 11, Michigan



Check 2693 opposite last page.

## King MANOMETERS

Every Size — for Every Service

### U-Type Manometers

- Single Cleanout
- Single Gland-Packed
- Double Cleanout
- Double Gland-Packed
- High Pressure

Low in price  
Trouble-free  
Easy to install  
and read

### Well-Type Manometers

- Low Well
- Raised Well
- Barometric Reading

Stay clean  
longer  
Easy to service

### Multi-Tube Manometers

- Multi-Well
- Common-Well
- Special-Purpose

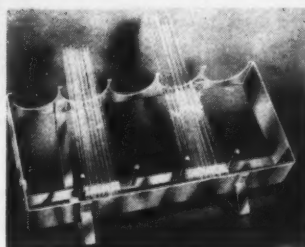
**FREE LITERATURE** gives sizes, construction and prices. Write today! And ask for informative 12-page Manual on Manometers.

KING ENGINEERING PRODUCTS include King-Gages — Manometers — Self-Closing Push Valves — Pressure Transmitters — Sight Feed Bubbler — Overflow Check Valves — Air-flow Snubbers — Sediment Traps — Moisture Indicators



Check 2694 opposite last page.

## LABORATORY



### Pipet Support . . .

. . . permitting easy storage and air drying of pipets, glass rods, other glass articles, will hold more than 200 pipets. Rack will withstand heat and cold and allow grouping of pipets into different sizes. Size is 20" long, 9½" wide, 9" deep.

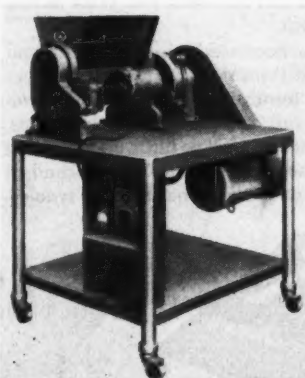
(Pipet rack is product of Scientific Products, Div. of American Hospital Supply Corp., Evanston, Illinois.)

Check 2695 opposite last page.

### Permits pelleting tests to be run in the lab

Laboratory-size mill duplicates production model

Uses: Conducting laboratory tests to determine proper evaluation of factors for pelleting chemical and pharmaceutical materials.



Pelleting experiments can be made in this lab mill without interrupting production unit

Features: Laboratory-size pellet mill allows tests to be run avoiding interruption in regular production runs. Pellet characteristics of ma-

## MEASURE

actual air velocity  
Instantly with

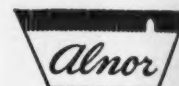
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A simple, direct reading on the Alnor Velometer gives you an instant measure of air flow speed through grilles, ducts, furnaces, spray booths, or in the open.

Precision-built and self-contained, this portable instrument brings laboratory standards to the line or field installation. Available in a wide variety of scale ranges, full assortment of jets and fittings. You'll want all the facts (no safety department should be without a Velometer). Get Bulletin 2448-G. Attach this ad to your letterhead and mail to: Illinois Testing Laboratories, Inc., Room 504, 420 No. LaSalle St., Chicago 10, Illinois.

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FOR EVERY INDUSTRY



Check 2696 opposite last page.



### FULL CONE—HOLLOW CONE—FLAT SPRAY

Spraco has the most complete line of nozzles available anywhere — **IN STOCK**. Capacities range from ½ pint/min. to 4000 gal./min. Bronze, cast iron, and stainless steel. Write for our nozzle catalog.

**SPRAY ENGINEERING CO., 125 Cambridge St., Burlington, Mass.**



Check 2697 opposite last page.

CHEMICAL PROCESSING



materials can be easily determined without contamination of experimental ingredients with other test lots or regular production runs.

**Description:** Model measures 32x32x50" and is mobile. Capacity is approximately 50 lb hourly of 3/16-inch pellets made of mash-type materials.

(Laboratory pellet mill is manufactured by California Pellet Mill Co., Dept. CP, 1800 Folsom St., San Francisco 3, California.)

Check 2698 opposite last page.

**Sensitive detector cell  
signals fractional  
parts per million**

Gas chromatography cell can operate to 200°C

**Uses:** As detector cell for manufacturer's gas chromatography analyzers. Instrument can be used as replacement part in chromatographic instrumentation.

**Features:** Detector cell signals minute traces as low as 1 ppm and fractional ppm, following specified techniques. Ratio of "signal to noise" is extremely high.

**Description:** Four closely-matched metallic cell filaments operate at low black heat. Of small mass, filaments are directly in gas stream and not offset. Said to be corrosion-proof, filaments are not masked by glass or other protective coating which would reduce sensitivity and increase response time. Filament cavities have volume of 0.25 ml.

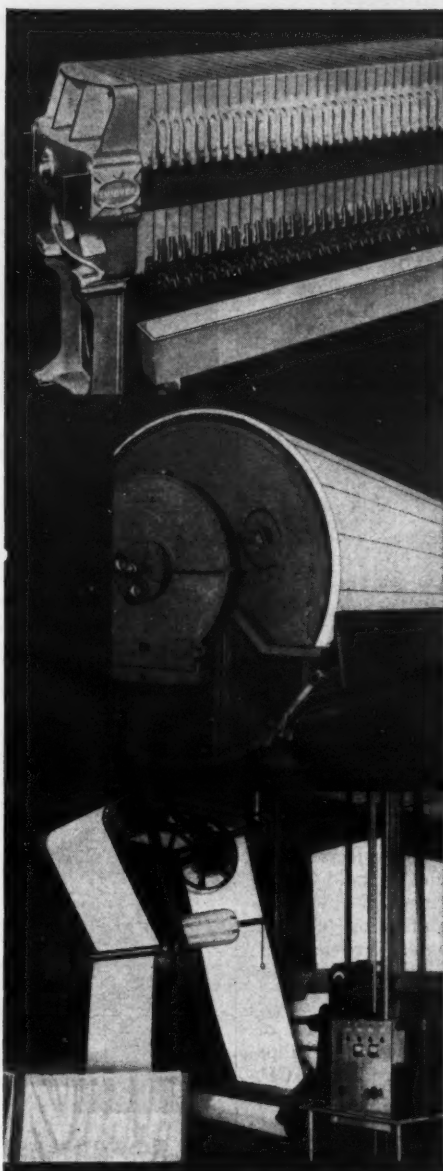
Cells are mounted in individual, insulated, heavy-wall thermostatic-contact-temperature air baths maintained within  $\pm 0.02^\circ\text{C}$ . Heat exchangers stabilize sample and element at bath temperature.

Instrument is balanced for sensitivity at both high and low temperatures. Unit will operate continuously at 200°C.

(Gas chromatography detector cell is product of Burrell Corp., 2223 Fifth Ave., Pittsburgh 19, Pennsylvania.)

Check 2699 opposite last page.

## FILTER FABRIC QUIZ



1. Of course you recognize this as a recessed-plate pressure filter. In such filters, where intervening frames are not present, is it true or false that filter cloths must have exceptionally high flex and abrasion resistance?

2. A cotton filter fabric is at work. Which of these is *not* characteristic of untreated cotton fabric: (a) very high wet strength; (b) surface slickness; (c) natural twist for spinning strong yarns.

3. Can you tell what's going on here in the textile finishing plant? Hints: the fabric is nylon, and the process is concerned with dimensional stability.

Here are a few more questions to test your knowledge of some basic filter fabric facts. Even if you score 100, we think you'll find it helpful to remember that you, as a processing engineer, don't have to know all the answers about filter fabrics. That's what we're here for. Wellington Sears people and the filter specialists who distribute our fabrics are always ready to lend a hand in solving your filter cloth problems. And for a handy book of information, write Dept. M-12 for "Filter Fabric Facts."

For answers, turn page upside down  
3. heat setting

2. (b)  
1. true



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**FIRST In Fabrics For Industry**

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Check 2700 opposite last page.

## a big line of SMALL packless valves



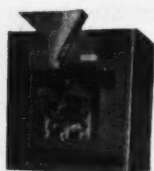
Hoke packless valves are designed for tough applications, like critical high vacuums, corrosive or dangerous fluids and high temperatures. Our experience with these problems has resulted in a line of packless valves broad enough to suit most every need. The valves shown here are typical Hoke designs. These and others are explained in detail in Bulletin PV656. Write for it. It's yours for the asking!



**HOKE INCORPORATED**  
Fluid Control Specialists  
145 S. DEAN STREET, ENGLEWOOD, N. J.

Check 2701 opposite last page.

## MAGNETIC SEPARATION



Model T-20 Magnetic Separator. A small machine for a quick evaluation.

Model T-25 Magnetic Separator. The ultimate laboratory equipment for results directly comparable with commercial models.

Laboratory Equipment for Accurately Evaluating the Feasibility of Magnetic Separation for Quality or Yield.

Exolon High Intensity Magnetic Separators flow material onto a magnetized rotor. Particles influenced by magnetism, cling to the rotor longer than non-magnetic particles. Knife dividers complete the separations.



Write for Literature

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Check 2702 opposite last page.

## LABORATORY

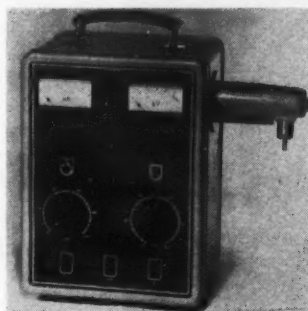
**Permits X-ray studies  
of difficult-to-handle  
opaque materials**

Contact microradiography instrument is portable

**Uses:** Microscopic examination of opaque materials that are difficult to handle with visible light methods.

**Features:** Contact microradiography (CMR) instrument is portable. Unit employs an X-ray tube which produces very soft radiation.

**Description:** Entire instrument is housed in small metal



Portable X-ray microradiography instrument uses soft radiation

cabinet 14 inches high. Cylindrical housing projects from side of cabinet to hold specimen and protect X-ray tube. Useful magnification of 500 can be obtained. Provision is made for cooling X-ray tube during long exposures.

(CMR analyzer is product of Instruments Division, Philips Electronics, Inc., Dept. CP, 750 S. Fulton Ave., Mount Vernon, N. Y.)

Check 2703 opposite last page.

**Creates severe conditions  
for stress-cracking  
polyethylene**

Test determines quality of polyethylene

**Uses:** As an immersion medium for making stress-cracking tests for polyethylene.

**Features:** Medium has a severely deteriorating effect on polyethylene. Quality of this plastic can be established

# NEW FILTER CLOTH CATALOG

Send for  
Your Copy  
NOW



Eight pages of data on all the latest synthetic fabric filter cloths... a valuable reference bulletin to anyone concerned with liquid filtration or dust collection. Write for your copy.



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Check 2704 opposite last page.

## How To Get Things Done



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**Gives you a Graphic Picture of your operations, spotlighted in color. You See what is happening at a glance. Facts at eye level—saves you time, prevents errors.**

**Simple, flexible—easily adapted to your needs. Easy to operate. Type or write on interchangeable cards, snap in groves. Ideal for production, scheduling, sales, traffic, inventory, etc. Made of metal. Compact, attractive.**

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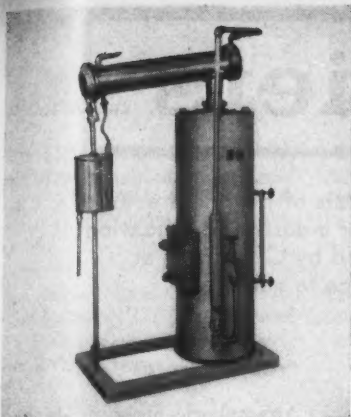
**GRAPHIC SYSTEMS**

55 WEST 42nd STREET  
NEW YORK 36, N. Y.

Check 2705 opposite last page.

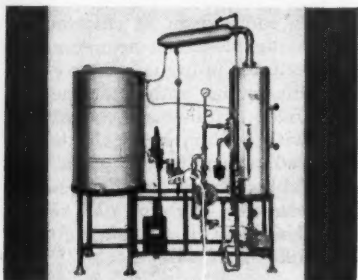
CHEMICAL PROCESSING





### BARNSTEAD DISTILLED WATER WHERE FREEDOM FROM BACTERIA AND ORGANIC MATTER IS A MUST

The Barnstead Model SMQ-30 Steam Heated Water Still illustrated produces 30 gallons per hour of pure distilled water. This model features the Barnstead Spanish Prison Baffle within the evaporator for complete removal of pyrogens. It is suited to either hard or soft water areas. Ideal for larger laboratories and production work where freedom from bacteria and organic matter is important.



### DISTILLED WATER PRODUCED AUTOMATICALLY

All Barnstead Stills can be furnished with full automatic controls for self-starting, self-stopping, and self-flushing. No manual attention whatsoever is required; the automatic controls start Still when storage tank level is low, stop the Still when the tank is full and flush sediment from the evaporator once every four hours during operation.

**NEW LITERATURE:** write for Demineralizer Catalog #127 and Barnstead Water Still Catalog "G".

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STILL & DEMINERALIZER CO.

BOSTON Jamaica 4-3100	NEW YORK Kingsbridge 8-1557	CLEVELAND Academy 6-9622
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66 Lanesville Terrace, Boston 31, Mass.  
**FIRST IN PURE WATER SINCE 1878**

Check 2706 opposite last page.

DECEMBER 1957

### LABORATORY

by immersion in this product before strain-stress testing, in accordance with a tentative ASTM procedure.

**Description:** Hostapal HL is a mixture of ethylene oxide condensation products.

(Hostapal HL is distributed by Carbic Color & Chemical Co., Inc., 451 Washington St., New York, New York.)

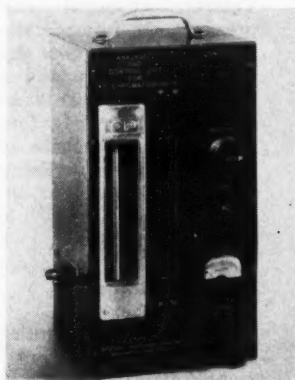
Check 2707 opposite last page.

### Designed for analysts who wish to make their own columns

**Uses:** As analysis and control unit for gas chromatography.

**Features:** Is designed for analysts desiring to make their own columns.

**Description:** Complete unit consists of a steel housing



Complete control unit for gas chromatography analysis

containing eight components. These include filter-drier for carrier gas, cell, millimeter for monitoring cell current, flowmeter, and necessary controls. Instrument operates on 110v 60 cps. Flowmeter can be calibrated and marked for desired rate, normally 50 cc's per minute.

Gas lines are 1/8" copper tubing. Recorders are also available to be used with analysis and control unit.

(Gas chromatography analysis unit is product of Westdahl Instrument Company, Dept. CP, Millington, N. J.)

Check 2708 opposite last page.

rapid  
short flame combustion  
...even on residual fuel oil

## T H E R M A L V O R T E X B U R N E R

Here is a versatile unit that gives rapid, clean combustion on a wide range of fuels including Bunker C, No. 6, light oil, any gas... even liquid organic wastes.

Combustion is 80% completed within the burner itself and takes place with a whirling, short flame that attains heat release rates of over 1,000,000 BTU/hr per cu ft. Products of combustion are clean and sufficient excess air for tempering the products may be introduced through the burner itself without causing smoke or instability.

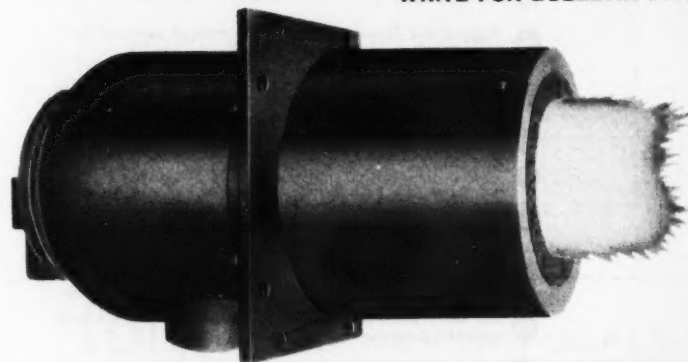
### standard models available...

Complete units from 3,500,000 BTU/hr to 50,000,000 BTU/hr are available and may be fitted for steam, compressed air or mechanical atomization. With dual fuel arrangements switching from gas to oil is accomplished without shutdown.

### instant ignition...

Gas-electric or torch ignition allows full ignition in a few seconds—even with a cold burner.

WRITE FOR BULLETIN #111



**OTHER THERMAL PRODUCTS & SERVICES**  
Gas, Oil & Combination Gas-Oil Burners • Heat Exchangers • Air Heaters • Submerged Combustion • Gas Generators • Combustion & Heat Transfer Engineering



## T H E R M A L

Thermal Research & Engineering Corp.

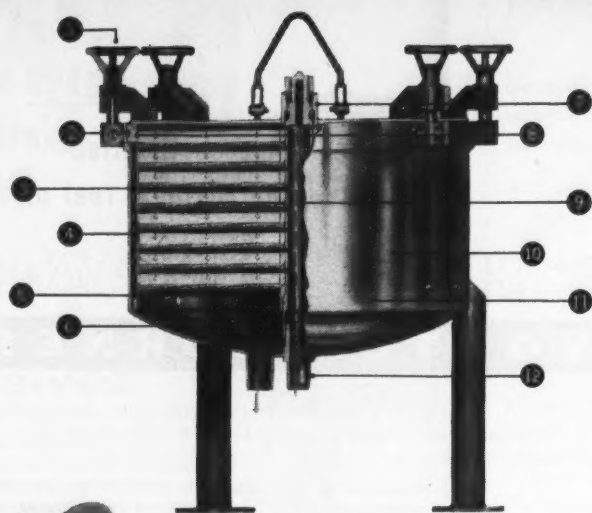
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REPRESENTATIVES IN PRINCIPAL CITIES



Check 2709 opposite last page.





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- ① Only a few handwheels and eyebolts and one central compression nut seal entire stack.
- ② Adjustable O-ring cover gasket provides perfect seal and adapts to different thickness filter media.
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- ⑥ Always a clean tank — solids never reach tank.
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- ⑧ Compression ring integral with cover seals plates uniformly around periphery.
- ⑨ Perforated plate or wire screen drainage member for exceptionally high flow rates.
- ⑩ All units are ASME CODE constructed for a 75 psig internal pressure.
- ⑪ Tank is not normally under any pressure.
- ⑫ Central inlet eliminates need for separate scavenger plate.

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SPECIALISTS IN LIQUID-SOLIDS SEPARATION

Check 2710 opposite last page.



## briefs

Abstracts of pertinent articles  
in other industrial publications ...  
selected by CP editors as  
a service to you

### Fuel synthesis

A fluidized process is used in research on synthesis of liquid fuels from carbon monoxide and hydrogen at the Chinese Institute of Petroleum. Fused iron and cobalt catalysts have been investigated. Five pages, five tables, one figure, 26 references, one photograph. ("Petroleum," September 1957, page 336.)

### Fluidization

Veteran chemical engineer presents an interpretation of incipient fluidization deduced from particle size and distribution. Treatment is mathematical. Four pages, four figures, four references. ("Petroleum Refiner," September 1957, page 305.)

### Water automation

This discussion of automation in a water treatment plant covers description of a central graphic instrument panel for filtration and backwash. Three pages, one figure, two photographs. ("Water Works Engineering," September 1957, page 904.)

### Cathodic protection

In pulp and paper mills, much waste caused by corrosion can be prevented by proper use of cathodic protection. The topic is developed under headings of causes of galvanic corrosion, local- and long-line cell corrosion, anodes to use, and current requirements. Four pages, eight figures. ("Paper Industry," September 1957, page 487.)

### Propyl nitrates

Atmospheric-pressure decomposition flames of isopropyl nitrate and normal-propyl nitrate are stabilized upon their liquid surfaces. Mechanism of flame degradation is the same as that for ethyl nitrate. Thirteen pages, two tables, one figure, 17 references. ("Combustion and Flame," September 1957, page 308.)

### Bleaching sulfate pulp

A comparison of chlorine dioxide bleaching sequences for sulfate pulp is reported. Bleaching with chlorine dioxide is followed by treatment with sodium hypochlorite and sodium sulfite. Six pages, four tables, five figures, seven references. ("Pulp and Paper Magazine of Canada," August 1957, page 137.)

### Termite control

Use of aqueous emulsion chemicals in the treatment of preconstruction soil is the answer to termite control in wooden structures. Five pages, four photographs. ("Soap and Chemical Specialties," August 1957, page 73.)

### Oxygen determination

For direct determination of oxygen in organic solid, liquid, and gaseous samples, a fluorination procedure can be used. Molecular oxygen is released and is collected and measured in a vacuum system. Four pages, one table, two figures, nine references. ("Analytical Chemistry," September 1957, page 1322.)

## Naval stores

Our \$150-million naval stores industry is composed of three parts: gum, wood, and sulfate naval stores. Tall oil has come to the fore, and research is centered on rosin. Five pages, one table, five figures, two photographs. ("Chemical and Engineering News," September 9, 1957, page 16.)

## fluoride determination

Simple, accurate method for determination of fluorides in water is described. Use of the ascorbic acid  $Ti^{+++}$  is made. Method employs easily available, easily stabilized reagents, and is as convenient and accurate as most of the methods in present use. Five pages, two tables, five figures, seven references. ("Journal of the American Water Works Association," September 1957, page 1234.)

## Cast latex films

Paper describes a simple method for predicting thickness of a latex film cast in gypsum mold. Three pages, four figures. ("Rubber Age," August 1957, page 804.)

## Aluminum alloys

This paper is concerned with thick oxide films on aluminum alloys. Preparation of such films by direct current, with special reference to hard anodes, is covered. Three pages, four tables, two figures. ("Metal Industries," September 13, 1957, page 217.)

## Atmospheric analysis

High-sensitivity continuous instrumentation for atmospheric analyses is discussed. Application to air pollution work and process stream analysis is covered. Four pages, one table, eight figures, 14 references. ("Chemical Engineering Progress," August 1957, page 381.)

## Cylinder drying

Drying capacity of a cylinder dryer can be increased by directing a stream of air to stagnant vapor layer which shrouds material to be dried. Air need not be heated. Six pages, seven figures. ("Journal of the Institute of Fuel," September 1957, page 506.)

## Ion exchange and nuclear technology

From England comes this discussion of the part that ion exchange plays in extraction and purification of uranium, treatment of nuclear reactor water, purification of zirconium, and in waste disposal where radioactive materials are concerned. Five pages, three figures. ("Chemical and Process Engineering," September 1957, page 367.)

## Heat pumps

Economics of heat pump operation are discussed. Comparisons with other systems of heating are made, and "coefficient of performance" is explained. Three pages, three figures. ("Plant Engineering," September 1957, page 130.)

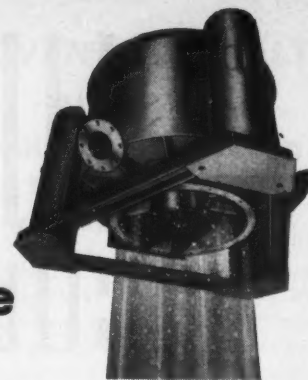
## Process control

Work on control of chemical processes so that specified compositions can be attained is described. Minimum processing times can also be achieved. Eight pages, 12 figures. ("Control Engineering," September 1957, page 197.)

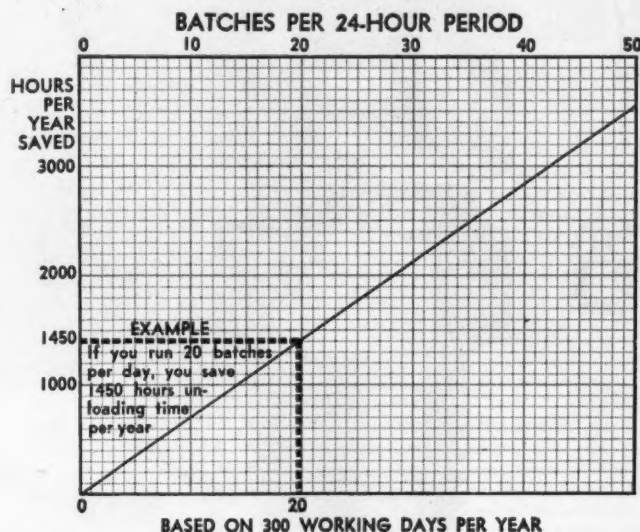
## Nuclear activation

When activated by radioactive neutron capture,  $I^{128}$ ,  $Cl^{38}$ , and  $Br^{80}$  can replace hydrocarbon radicals as well as hydrogen atoms. Other gas-phase reactions activated by nuclear processes are covered. Eight pages, two tables, two figures, 31 references. ("Journal of the American Chemical Society," September 1957, page 4609.)

# PREDICT the centrifuging hours you save in a year



This most revealing chart quickly shows how much unloading time you can actually save, with Batch-Master's rapid bottom discharge and hydraulic unloader. The chart is based on Batch-Master's unloading time (30 seconds average) . . . as compared with that of a manually unloaded batch centrifugal (15 minutes or more). If the chart gives you a jolt, investigate Batch-Master.



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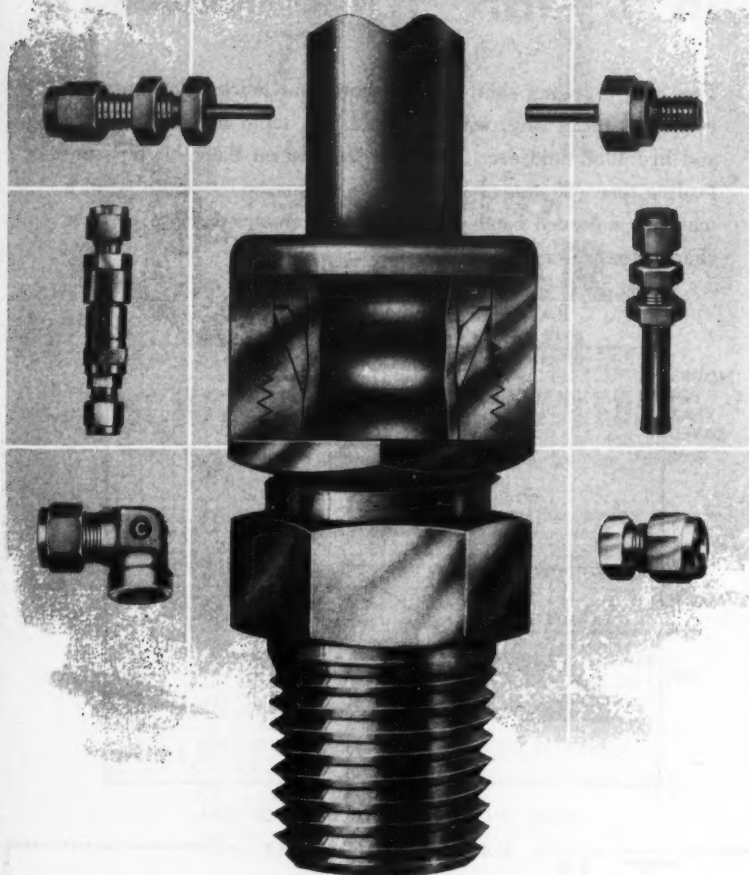
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CITY

ZONE STATE

Check 2711 opposite last page.

# HIGH vacuum seal



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### TUBE FITTINGS

For information on the extensive line of Swagelok High Vacuum Tube Fittings and the name of your Swagelok Specialist, write Dept. C8

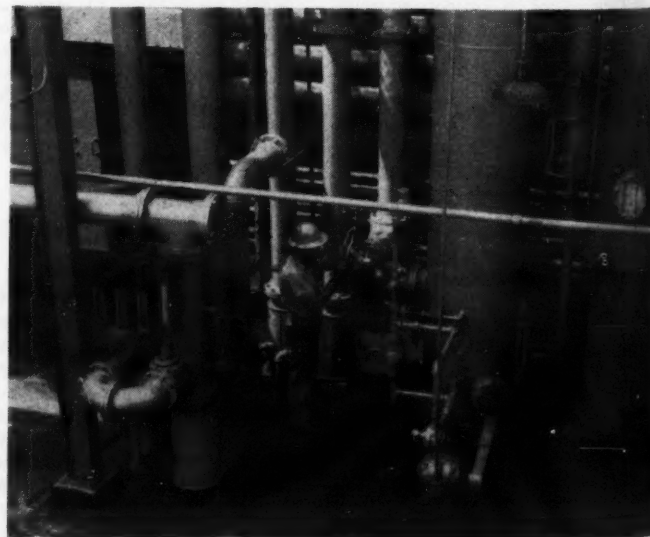
**CRAWFORD FITTING COMPANY**  
884 East 140th Street • Cleveland 10, Ohio

Check 2712 opposite last page.



Manifold of lubricated plug valves controls flow of  $CS_2$  and water to and from storage tanks beneath water level. In normal operation, valves are often covered with water to the shoulder

Worm-gear-operated valves here control flow of  $CS_2$  to and from oil absorption towers where last of product is removed from process stream. Tapered plug and lubricant seal assure tight, leak-free operation







## PLANT ENGINEERING & MAINTENANCE

... electrical & mechanical developments

**In handling volatile, toxic material,  
a tight piping system is essential.**

At Stauffer Chemical Co . . .

### LUBRICATED PLUG VALVES MAINTAIN LEAKPROOF CS<sub>2</sub> SYSTEM

**Problem:** Carbon bisulfide is highly volatile, flammable when mixed with air, and toxic. At Stauffer Chemical Co.'s Roanoke, Va., manufacturing plant, pumps on lines handling this material are specially designed to preclude possibility of leakage. Piping is of high-grade steel. To maintain a completely tight, dependable process system for 24-hr-a-day operation, valves for controlling CS<sub>2</sub> flow had to give tight leak-free shut-off and remain operable even after being in full-open position for several weeks.

**Solution:** Stauffer, largest producer of carbon bisulfide in the United States, selected lubricated plug valves for all CS<sub>2</sub> and sulfur lines. Sulfur is steam-melted and pumped to bank of gas-fired reactors. Steam-jacketed valves — with double-walled body providing heating space surrounding plug seat and outlet throats — are used on molten sulfur lines to prevent solids from forming.

In reactors, solid charcoals and other carbons are introduced. CS<sub>2</sub> vapor is carried off at high temperatures to large water-cooled cylindrical tanks where main portion condenses. Condensed material is gravity-fed to crude storage. Remaining gas is further processed to remove last traces of CS<sub>2</sub>. Crude material is distilled and piped by gravity to underground storage to await shipment.

Over 150 valves, ranging in size from one to six inches, are used in piping system.

Valves have only three basic parts: body, cover, and plug. Tight shut-off against process fluid is afforded by tapered fit of plug which is only movable member, plus lubricant seal between grooves in plug and valve body. Pressure lubrication maintains this seal, and flushes and cleans seating surfaces.

**Results:** With over 70 years experience in CS<sub>2</sub> systems, Stauffer has found lubricated plug valve most satisfactory for this service. Units on underground storage have given leak-free service until, in some cases, the heads have become stripped with constant turning. But no valves have had to be replaced.

A program of periodic lubrication, performed by grease gun while valves are in service, is all that has been necessary to maintain them in good



Valve manifold controls flow of crude CS<sub>2</sub> from condensation to crude storage

Cambridge

## WOVEN WIRE BELTS give you continuous processing to lower costs, increase uniformity

You can eliminate time-consuming and expensive batch handling by using woven wire conveyor belts to combine movement with processing. Slab, sheet, granular or pelletized materials can be rapidly and uniformly washed, dried, heated or cooled in one smooth, continuous operation. In packaging, filling, weighing or sealing operations, uninterrupted movement on wire belts helps increase production and cut labor costs by eliminating manual handling. **EXAMPLE:**

### Continuous Drying

**MOVING BELTS** carry fibres through drying oven in steady, continuous operation.

**OPEN MESH** allows free circulation of heat or process atmospheres around all parts of product. In washing or chemical treating operations, open mesh also permits quick drainage of process solution, uniform treatment of material. Spilled material drops through for easy salvage.

**ALL METAL BELT** easily withstands temperatures from sub-zero up to 2100° F.; rust-proof alloys can be used for operation in corrosive conditions.

**WOVEN WIRE CONSTRUCTION** provides extra strength, extra long life. There are no seams, lacers or fasteners to break or wear. Special raised edges or surface attachments are available to hold even smallest parts in position on the belt during flat or inclined movement.

Cambridge Woven Wire Conveyor Belts are made in any size, mesh or weave, from any metal or alloy, and can be used under a wide range of conditions . . . hot or cold . . . wet or dry. Call your Cambridge Field Engineer to discuss how you can cut costs with continuous processing on woven wire conveyor belts. Look for his telephone number under "Belting, Mechanical" in the Yellow Pages. Or, write for **FREE 130-PAGE REFERENCE MANUAL.**



**The Cambridge Wire Cloth Co.**

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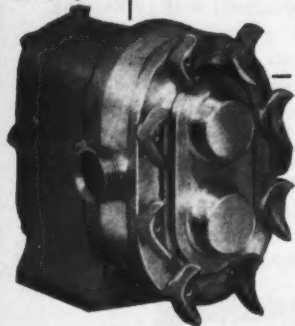
OFFICES IN PRINCIPAL INDUSTRIAL CITIES



Check 2713 opposite last page.

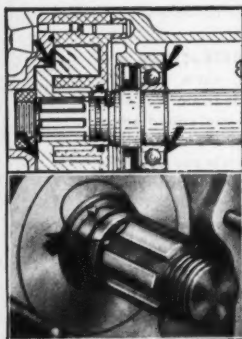


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at Lowest  
Maintenance...  
in High Corrosion,  
High-Temperature  
Pumping...with**



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P.D.\*  
CORROSION  
RESISTANT PUMPS**

Both metallurgically and mechanically, Waukesha P.D. Pumps are designed specifically to meet the rigid demands of the chemical industry in pumping corrosive products under most temperature conditions. The Waukesha Metals used are the result of over a quarter century of pioneering in corrosion-resistant formulas, including stainless steels. And, mechanically, there are at least *eighteen* reasons for the longer service and lowest maintenance already proved in the industry. These "reasons" include such important factors as positive sealing with Twin O-Rings, better load-balance between shafts and heavy duty bearings, larger, stronger shafts, more and huskier splines — for greater rigidity, less wear — and newly designed twin blade impellers for better distribution of the load factor at all speeds and pressures. There are many more new features you'll want to know about.



This drawing shows the close position between the heavy duty ball bearings and the corrosion-resistant impellers — for reduced shaft-slap and wear.

Larger diameter shafts, more and larger splines, plus a new stainless steel shaft seal with positioning pin, assure greater rigidity to impellers and longer service.

This new WAUKESHA 1957 Catalog gives you the whole story. Write for your copy, telling us what product you handle . . . Just a postcard will do.

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**ONLY  
Waukesha**  
gives you a quarter century's  
experience and reliability

**Waukesha**  
FOUNDRY COMPANY  
DEPT. P-12, WAUKESHA, WISCONSIN

Check 2714 opposite last page.

## ENGINEERING

condition. Lubrication also can serve in "jacking" units that have been in one position for long periods, so that they can be turned freely and easily.

(Lubricated plug valves were supplied by Rockwell Manufacturing Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.)

Check 2715 opposite last page.

**Temperatures to  $-300^{\circ}$  F  
handled by expander unit  
for gas liquification**

Handles inlet pressures up to  
3000 psig

Uses: For gas liquification  
service.

Features: Unit is capable of  
handling temperatures as low  
as  $-300^{\circ}$ F, and inlet pressures  
up to 3000 psig.

Description: Standard engine is reciprocating piston-type machine which generates shaft horsepower as useful by-product. The energy of gas expansion is converted through piston, cylinder, and crank shaft. Expander engine can be coupled directly to compressor drive shaft, electrical generator, or brake, as desired. An air flow of 250 lb per min at inlet pressure of 3000 psig and outlet pressure of 250 psig develops over 200 brake hp in crank shaft. Regulation of air or gas capacity can be easily controlled to suit needs of particular plant.

(JX-14 expander engine is product of The Cooper-Bessemer Corp., Mount Vernon, Ohio.)

Check 2716 opposite last page.

**Extensive range of power  
and speed possible  
on agitator-drive**

Uses: Agitator-drive for  
glass-lined and stainless steel  
reactors.

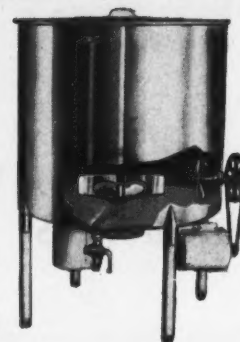
Features: Range of power  
and agitator speed possible  
make unit highly versatile.

Description: Agitator drive  
unit is compactly constructed,  
has silent operation and wide  
interchangeability of compo-



**FILPACO**

STAINLESS  
STEEL TANKS



**Designed  
for storage or  
processing  
to give you  
maximum service**

All styles including vertical, horizontal, and rectangular . . . open & closed . . . IN STOCK or to your specifications.

★ QUALITY  
★ SERVICE  
★ PRICE

**WRITE FOR LITERATURE TODAY!**

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**FILPACO INDUSTRIES  
THE FILTER PAPER CO.**

2432 So. Michigan Avenue, Chicago 16, Ill.

Check 2717 opposite last page.

Darcova Pumcup

Darcova 45°  
Bevel Type Pumcup



**Put Pumcups in your cylinders  
TO HOLD PRESSURE LONGER!**

In Darcova Pumcups a sound engineering principle has been combined with precision tolerances and extremely durable compositions to provide exceptional efficiency and life in hydraulic, air, and reciprocating pump cylinders of all kinds.

Unlike ordinary piston packing, precision Pumcups are engineered to minimize friction load while hugging cylinder walls on every pressure stroke. Regardless of eventual wear, efficiency *stays* high! So there's far less down-time and need for replacement.

Pumcups are made in a wide range of sizes, types and texture-engineered compositions, including 100% Nylon, for all kinds of pressure-temperature-fluid conditions. Send for Pumcup Bulletin 5503 and weigh all the facts!

**DARLING VALVE & MANUFACTURING CO.**  
Williamsport 4, Pa.



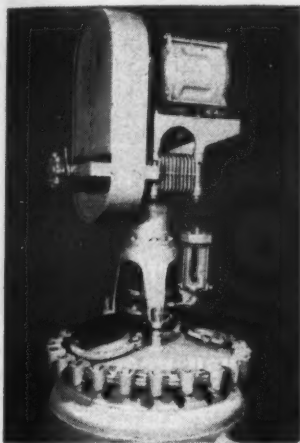
TRADE MARK  
**Pumcups**

Check 2718 opposite last page.

CHEMICAL PROCESSING



nents. Standard sheaves with static-free belts combine to give any required speed for desirable agitation. Variable sheaves with static-free belts are available to give much greater agitator speed which ranges from 600/120 to 100/20. Hydraulic drive can be sup-



Agitator-drive features wide speed and power range

plied at factory, or existing drives in field can be quickly converted with hydraulic motor. Drive can also be furnished with double-reduction gearing and flange-mounted motor to provide totally enclosed gear drive for agitator speeds from 525 to 7.3 rpm in 27 increments.

(Type "W" agitator drive is product of Pfaudler Co., Rochester, N. Y.)

Check 2719 opposite last page.



Thanks to Tom Blakley, Florida East Coast Fertilizer Co., Homestead, Florida



## IN QUALITY, DEPENDABILITY, AND LONG SERVICE LIFE ...

... And WELDCO Tubular Products keep moving ahead as more and more buyers discover their many important advantages. WELDCO is produced by specialists — men who have the equipment, facilities and experience to manufacture pipe and tubing to your exact specifications. It's automatically machine-welded under pressure, properly formed, carefully finished, accurately sized and straightened, and rigidly checked. And remember, too, only WELDCO is welded with the exclu-

sive Double-Fusion Process. ... It's available in Stainless Steel, Monel, Inconel, Nickel, Cupro-Nickel, and Hastelloy, in tube and pipe sizes from 3" to 30", Schedules 5 and 10, and 3" to 12", Schedule 40. To get lightweight, corrosion-resistant Tubing with complete uniformity and long service life, always specify WELDCO — your best buy in top-quality tubing.

# WELDCO

Whatever Your Needs In Tubing ...  
You're 'Way Ahead With WELDCO

**THE YOUNGSTOWN WELDING & ENGINEERING CO.**  
3728 OAKWOOD AVE. YOUNGSTOWN 9, OHIO

Check 2720 opposite last page.





# silent system

Piping systems in every industry have been made free from troublesome water hammer . . . free from dangerous surge pressures. *Silent* Check Valves eliminate these hazards by operating instantly when flow reversal starts or when flow is zero. Write for descriptive Bulletins.

Globe type for 3" to 24" lines.

Center-guided type for lines from 1" to 10".



WILLIAMS-HAGER

## Silent CHECK VALVES

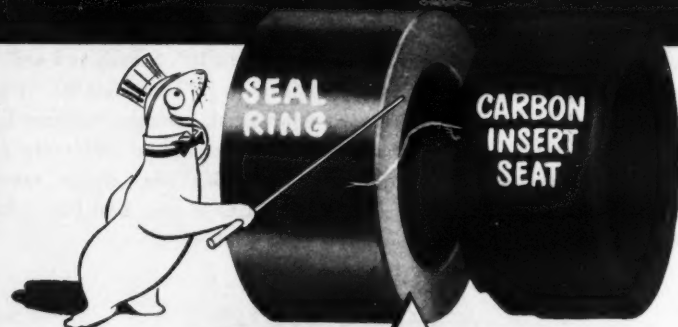
Write for Bulletins No. 654 on the Valves; No. 851 on Cause, Effect and Control of Water Hammer

THE WILLIAMS GAUGE CO., INC.

146 STANWIX STREET  
2 GATEWAY CENTER PITTSBURGH 22, PA.  
Our 71st Year—1886-1957

Check 2721 opposite last page.

## #55 FACED MECHANICAL SEALS RESIST WEAR AND CORROSION



### #55 FACING MATERIAL

THIS BULLETIN TELLS THE STORY

... For further details write today for a copy of Bulletin No. 469CP

\*ROKIDE Process Coating developed by the Norton Co. of Worcester, Mass.

A new and superior facing material is now available on the engineered mechanical DURA SEAL. #55 faced seal rings are long-wearing, operate at extremely high or low temperatures, and present highest resistance to wear and corrosion. #55 Facing Material combines the low-friction benefits of ceramic materials with the strength and resistance of alloyed steels.



Check 2722 opposite last page.

## ENGINEERING

### Choosing an extruder

Impartial engineering analysis of current plastics extruder design, and wealth of information on principles of extrusion in their latest form are contained in 52-page book on choosing an extruder. Bul E-3 — Prodex Corp., King George Post Rd., Fords, New Jersey.

Check 2723 opposite last page.

### Halts back-pressure danger, automatically shuts off product flow

Vented-cover pumphead eliminates by-pass

Uses: As pumps in flow lines involving light liquids, to heavy viscous products.

Features: Unit provides automatic shut-off of product flow to prevent excessive pressure build-up. It eliminates need for troublesome by-pass assemblies.

Description: Two types of vented-cover controls are available, for either manual or pneumatic control, depending upon application. Manual control is recommended for normal applications where minimum of 4 to 5-lb differential is



Vented-cover pumphead eliminates need for troublesome by-pass assemblies

sufficient. Pneumatic-controlled vented pumphead introduces control as fine as one-lb of back pressures on liquid products. This involves use of air or CO<sub>2</sub> pressure from pressure-control valve to vented-cover pumphead. Pressure in seal chamber is exerted against rubber or Kel-F diaphragm, which seals



Chances are Binks makes exactly the spray nozzles you need

for washing, cooling, processing, humidifying, dehydrating and hundreds of other applications. Whatever your production or process requirements . . . you'll get the right spray nozzles quicker by calling Binks.

There is a size and spray pattern for every purpose . . . with nozzles cast or machined from standard or special corrosion-resistant metals and materials.

Send for Catalog 5600

Gives details on nozzle applications, sizes, capacities, spray patterns and metals. Easy to use selection tables.



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Chicago 12, Ill.

Send me your comprehensive Spray Nozzle Catalog 5600—no obligation, of course.

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CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

## Binks

A COMPLETE LINE OF INDUSTRIAL SPRAY NOZZLES AND COOLING TOWERS

MAIL COUPON NOW

Check 2724 opposite last page.

CHEMICAL PROCESSING

off passage between suction and discharge side of pump when head pressure becomes excessive. None of product is recirculated within vented cover. Manual or pneumatic vented cover can be provided on all sizes and models of manufacturer's positive-displacement sanitary or corrosion-resistant pumps, including V-belt, gear-head, and side-mounted pumps. Metals used and gasketing material can be specified to meet individual corrosion problems.

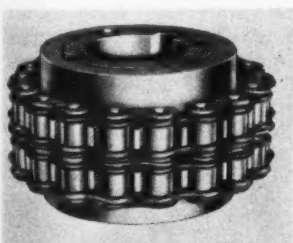
(Vented-cover pumphead is product of Waukesha Foundry Co., Waukesha, Wis.)

Check 2725 opposite last page.

**Standard shaft diameters can be met from stock with taper bushings**

**Uses:** As flexible shaft coupling.

**Features:** Taper bushings are supplied with bores in increments of 1/16" so that all standard shaft diameters can be met from stock.



Flexible shaft couplings are available with interchangeable taper bushings

**Description:** Flexible shaft couplings are easily installed on shafts, absorb moderate end-play and misalignment, provide long service, and can be coupled and uncoupled by removal of single roller chain connecting pin. Complete line of roller chain couplings ranges from fractional to hundreds of horsepower.

(Flexible shaft couplings are available from Diamond Chain Co., Inc., Dept. 411, 402 Kentucky Ave., Indianapolis 17, Indiana.)

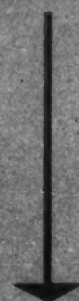
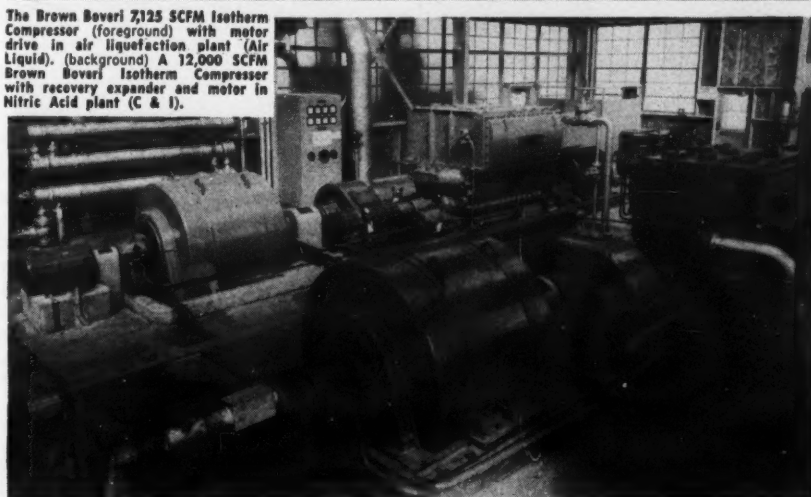
Check 2726 opposite last page.

for -

**Large Volume\*  
Medium Pressure\***

**Oil-Free Air  
at Lower Cost**

The Brown Boveri 2125 SCFM Isotherm Compressor (foreground) with motor drive in air liquefaction plant (Air Liquid). (background) A 12,000 SCFM Brown Boveri Isotherm Compressor with recovery expander and motor in Nitric Acid plant (C & I).



the

**BROWN  
BOVERI  
ISOTHERM COMPRESSOR**

WHERE large volumes of oil-free air (5,000 SCFM and up, 100-300 PSIA)\* are required, there is no better equipment available today to achieve "close to isotherm" type of compression, assuring the lowest possible kW input, than a Brown Boveri Isotherm Compressor.

If "tail" gas is available, the high efficiency, reaction type Brown Boveri expander can be applied in the cycle with the Isotherm Compressor to improve further the economy of the process. As drive for the compressor a synchronous, induction or other type of motor, or a steam- or gas-turbine can be used.

Over half a century's background in the manufacture of this Brown Boveri equipment (including control and all accessories) is your positive assurance of the ultimate in the reliability of this "packaged" unit. Write for more information, today!



**BROWN BOVERI CORPORATION**  
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Atlanta, Ga. • Birmingham, Ala. • Boston, Mass. • Buffalo, N. Y. • Chicago, Ill. • Cleveland, O. • Dallas, Tex. • Denver, Colo. • Detroit, Mich. • Hamilton, O. • Jacksonville, Fla. • Kansas City, Mo. • Knoxville, Tenn. • Miami, Fla. • Minneapolis, Minn. • New Orleans, La. • New York, N. Y. • Portland, Ore. • Pittsburgh, Pa. • Portland, Ore. • Rochester, N. Y. • San Francisco, Calif. • San Juan, P. R. • Seattle, Wash. • St. Louis, Mo. • Tulsa, Okla.

Check 2727 opposite last page.





## A decade of repeat orders... to the tune of 330 tanks

The only thing unusual about this tank is that it is one of 330 units made at Downingtown to the same basic design.

It measures 8' in diameter and 12' high. Material is carbon steel. Interior welds are ground flush and smooth. Operating pressures are nominal.

But the tank represents customer satisfaction with Downingtown workmanship, delivery, price—330 times over.

Send for bulletins detailing our experience and facilities.

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### Downingtown Iron Works, Inc.

144 Wallace Ave., Downingtown, Pennsylvania

division of **PRESSED STEEL TANK COMPANY** Milwaukee  
Branch offices in principal cities

**HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION**  
**CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS**



Check 2728 opposite last page.

## PLANT ENGINEERING & MAINTENANCE

Standard packing was out of the question in pumps handling sulfuric acid for sulfonation at petrochemical plant. It lasted barely a week. First mechanical seal tried was expensive, hard to install. Present seal . . .

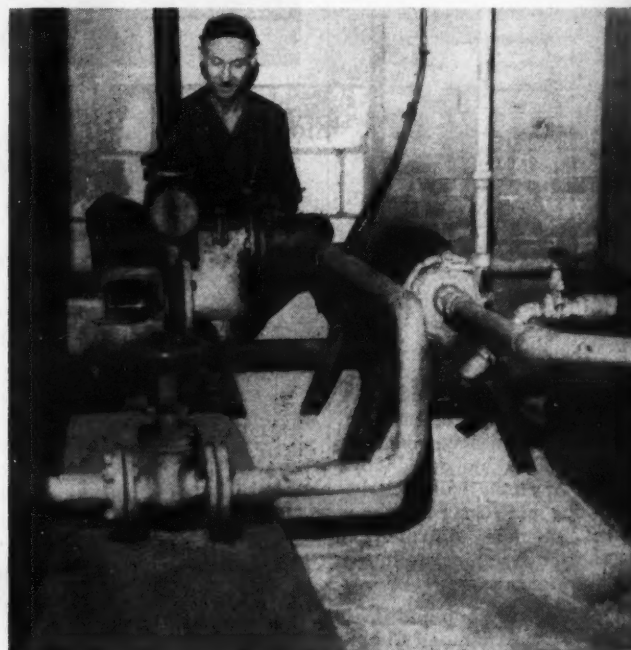
## holds sulfuric acid in check at 1/4 former shaft sealing cost

**THEODORE W. WETT**, Assistant Editor  
With **T. J. KAROLENKO**, Plant Superintendent  
Petrochemicals Dept., Continental Oil Co.  
Chicago, Illinois

**Problem:** Standard packing lasted roughly eight days at best in four pumps handling 101.6 and 78-80% sulfuric acid, at Continental Oil Co.'s alkyl aryl sulfonate producing facilities, Chicago, Ill. Pumps handle 80,000 to 100,000 lb/day of acid at temperatures up to 130-135°F. They are centrif-

ugals with steel impeller shafts for fresh acid and Ni-resist shafts for spent acid. Two pumps are used to take fresh 101.6% acid from storage to weigh scale and then to sulfonator, and two to take spent 78-80% acid to storage and then to return tankcars.

One type of mechanical seal



Easily installed mechanical seal on this centrifugal pump costs less than former unit used, can be installed without special adaption. Standard packing lasted eight days handling sulfuric acid; seal gives 8 to 10 months service



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Sulfuric acid pumped by centrifugals with mechanical seal is used for sulfonation in production of alkyl aryl sulfonate shown here being discharged from spray dryer at Continental Oil Co.

was installed on three of the pumps on an evaluation basis. Seal was expensive and required special adaption and considerable mechanical skill for proper installation. Although performance was satisfactory, a more easily installed, less expensive device was sought.

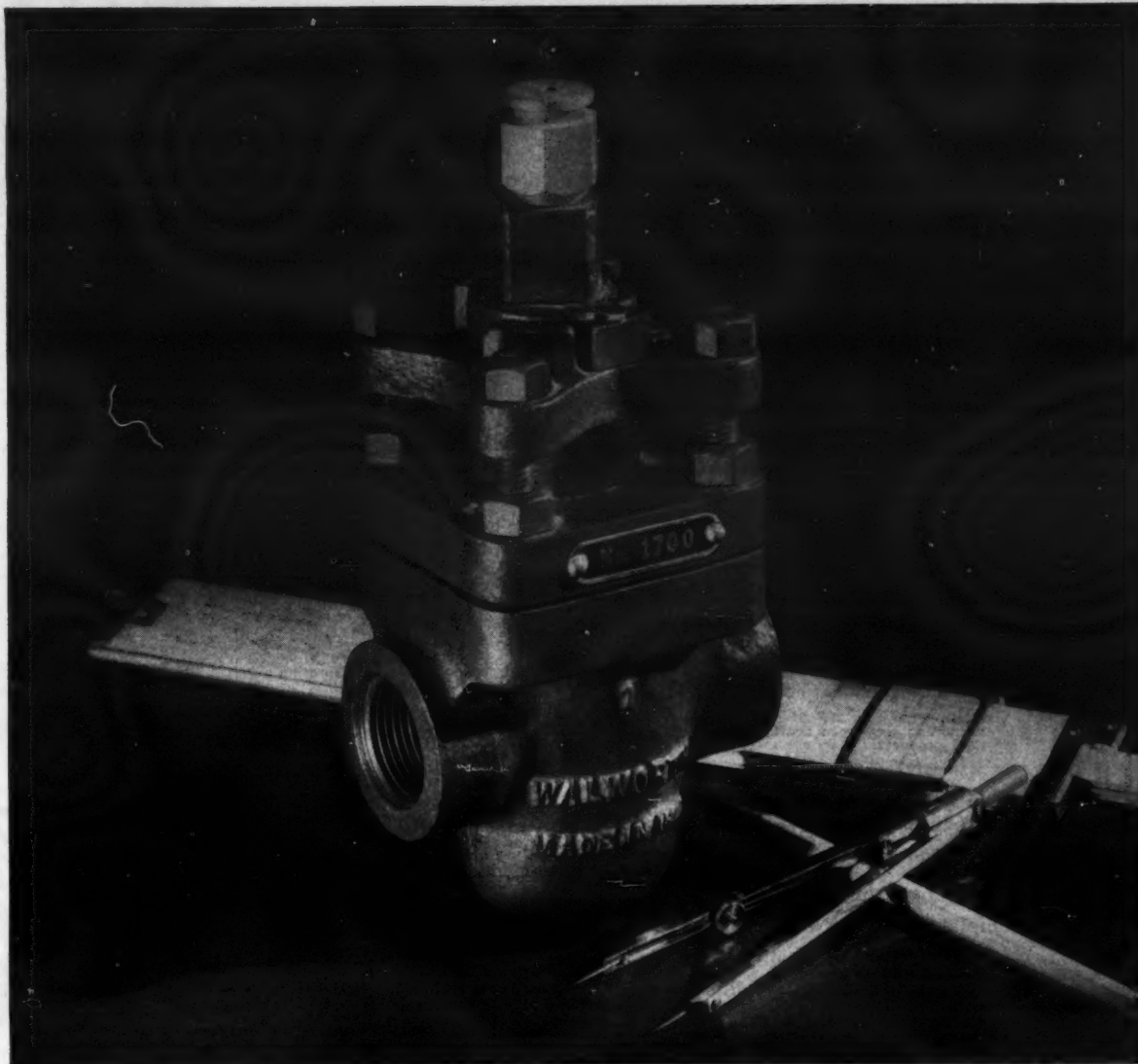
**Solution:** In April 1955, Continental Oil installed a 1-inch mechanical seal with a carbon-filled Teflon rotary seal face and Teflon bellows. A ceramic stationary face is secured to stuffing box. Rotary face with balance of seal mechanism is secured to shaft. Static leakproof seal between precision ground faces is accomplished by spring loaded Teflon bellows which provides balanced circumferential pressure on rotary face. Dynamic seal is obtained when pump fluid at actual stuffing-box pressure actuates the Teflon bellows.

**Results:** Seal was installed at less than one-fourth total cost of previous unit, without special adaption, by regular maintenance personnel. Within six months all four of pumps were fitted with this seal. Service life is equal to more expensive unit, about 8 to 10 months, compared to maximum of eight days with standard packing.

(Chemiseal mechanical seal is supplied by The Garlock Packing Co., Palmyra, N.Y.)

Check 2729 opposite last page.

Illustrated here is the Walworth Lubricated Plug Valve No. 1700, available in sizes from 1/2" to 5" inclusive, suitable for 200 pounds water, oil, or gas working pressure.



*problem-solvers for tough jobs*

## **\*LPV's by WALWORTH**

If you're familiar with the basic advantages of Plug Valves, you know why Walworth Lubricated Plug Valves work so well in really tough spots. You know about their direct port opening ... their dead tight shut off. Seating and sealing surfaces are fully protected from attack by fluids being handled by insoluble lubricants.

\*Lubricated Plug Valves

Remember, you can get Walworth LPV's in all sizes ... from 1/2 to 30 inches ... for pressures up to 5000 psi and for vacuum service ... in a number of different styles and patterns. For more information about LPV's and for your copy of the new Walworth LPV Circular, see your local Walworth Distributor.

### **WALWORTH**

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

**WALWORTH SUBSIDIARIES:** ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO. • SOUTHWEST FABRICATING & WELDING CO., INC. • M&H VALVE & FITTINGS CO. • WALWORTH COMPANY OF CANADA, LTD.

Check 2730 opposite last page.



11' 1" diameter x 250' 0" high, butt welded, self-supporting steel open hearth stack for a leading steel producer.

## TALL Against the Sky...

... this stack was furnished and fabricated complete including breeching section, in our Youngstown, Ohio, plant. It was shipped knocked down to the job site via rail. There, our construction department took over and erected the stack as shown in record time.

The Youngstown Steel Tank Company maintains a complete stack service including design, fabrication, construction, inspection and repair. We specialize in the steel producing and petro-chemical processing industries.



**The YOUNGSTOWN  
STEEL TANK  
COMPANY**

Youngstown, Ohio

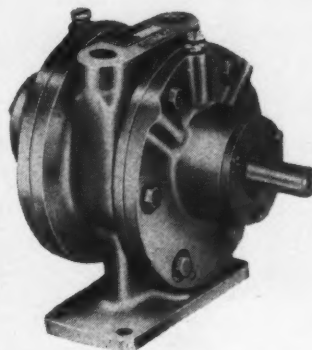
Check 2731 opposite last page.

## ENGINEERING

### Reversible motor control with four-way valve on rotary air motor

**Uses:** For application such as pneumatic hoists or lifts, material handling equipment, machine tool positioning, or powering screw jacks.

**Features:** Instantly reversible motor control can be ob-



By inserting four-way operating valve in air supply line, instantly reversible motor control can be obtained

tained with any four-way operating valve built for pressures below 100 psi.

**Description:** Rotary air motors with single rotation, either right or left, are also offered and have similar dimensions and performance ratings. Motor is available in 1/2 to 2-hp range. All models weigh about 17 lb, are explosion-proof, and variable in speed from 300 to 2000 rpm on air line pressures from 30 to 90 psi. Mounting base is standard. Muffler is included on non-reversible models only. Motor ports fit 3/8" standard pipe.

(Model 6AM reversible rotary air motor is available from Gast Mfg. Corp., Box 117N, Benton Harbor, Michigan.)

Check 2732 opposite last page.

### Seamless tube data

Folder of eight pages explains cost- and time-saving benefits of seamless mechanical tube over other forms of stock. Bul TB-340A—Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa.

Check 2733 opposite last page.

## SPRAY NOZZLE

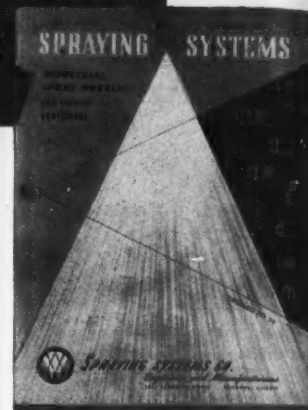
*write for  
your free  
copy today*

REFERENCE  
MANUAL

SPRAYING SYSTEMS

• to help you  
improve a  
spraying  
operation

• to help you  
lower a  
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The most complete industrial spray nozzle catalog ever produced. Gives you reference data on thousands of standard and special spray nozzles for every type of spraying.

WRITE FOR your free copy of Catalog No. 24

**SPRAYING SYSTEMS CO.**  
3216 Randolph St. Bellwood, Illinois

Check 2734 opposite last page.

*Only ONE Torque Wrench  
can be accurately used  
with...*

**EXTENSIONS and  
ADAPTERS**

It is mechanically impossible to use any Torque Wrench with adapters or extensions (with accuracy) unless that Torque Wrench has a positive, built-in, fixed load position.

This essential factor of accuracy, misunderstood or ignored in the design and manufacture of some torque tools, can completely defeat their purpose.

**PATENTED  
PIVOTED HANDLE  
FIXES LOAD POSITION**



*Write for Torque Manual*

with formulae tables and explanations for correct use of adapters and extensions.

PA **STURTEVANT CO.**  
ADDISON [QUALITY] ILLINOIS

Check 2735 opposite last page.

CHEMICAL PROCESSING



THAT'S  
INTERESTING

#### Blinding radar

any structure covered with a newly developed microwave-absorbing material becomes invisible to a radar beam.

Highly expanded polystyrene is treated to give a specific attenuation. It is supplied as rigid blocks, 15 inches square, by Gulton Industries, Inc., Metuchen, N.J. This offers first possibility that radar warning defenses can be defeated.

#### Square bubbles

Brilliantly colored microscopic bubbles in square and rectangular forms appear in lithium fluoride crystals after they have been irradiated with neutrons, then heated above 600° C. No bubbles of any kind form in lithium fluoride that was not first irradiated.

It is believed formation of helium, tritium are responsible for the bubbles.

For more information on product at right, specify 2736 see information request blank opposite last page.



## with FALK Steelflex Couplings

Ever since the first Falk Steelflex Coupling was designed and built, we have firmly held to these beliefs:

1. A coupling, to give fullest value, must do more than merely connect driving and driven machinery—it must protect the machinery and prolong its life.
2. A coupling, to be truly flexible, must overcome the effects of shock and vibration, as well as shaft misalignment.

Proof of the soundness of those beliefs is furnished by the record. More than one million Falk Steelflex Couplings have been used on every conceivable type of industrial application... giving trouble-free service, providing maximum protection to connected machinery.

\* A single basic type—the famous Type F—fills 90% of all industrial application needs. It is versatile, efficient and economical. And—it is always available from factory, field or distributor stocks, in a wide range of sizes.

Write to Department 247 for engineering bulletin, including selection and dimension tables.

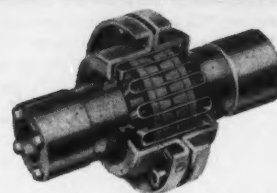
THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF:

- Motorreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

# FALK

...a good name in industry

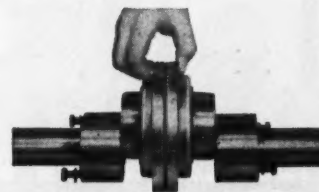


### The New Type F Spacer Coupling

Here is a Steelflex coupling specially designed to permit fast, easy installation and removal in horizontal and vertical applications where it is impracticable to move the connected units—or where a space-gap (up to 12 in.) is necessary.

Like all Steelflex couplings, the Type F Spacer gives long, trouble-free service and maximum 3-way protection for connected machinery: it provides torsional resilience to reduce shock and vibration; it accommodates parallel or angular shaft misalignment; it allows free (or limited) end float.

An outstanding feature of the Steelflex Spacer is that it can be installed or removed in one piece (see photo below); no dismantling or servicing of the coupling is required. Pump assemblies can be disconnected and removed without disassembling the coupling, without exposing working parts.

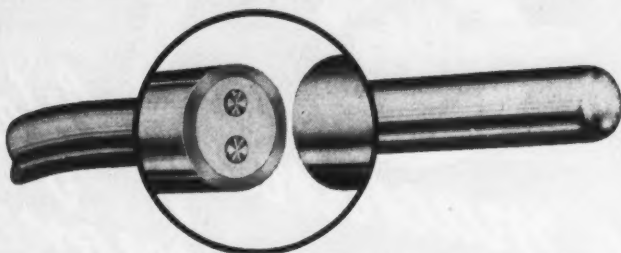


The Steelflex Spacer coupling is prelubricated at the factory and can be installed, or removed and reinstalled, without disturbing the lubricant—a highly desirable feature.



## Longer Thermocouple Life In Atomic Reactors

With T-E Ceramo® Wire Thermocouples



Designed for use under extremely severe conditions, enclosed hot-junction "Ceramo" thermocouples—with ceramic insulated, metal sheathed wire—will outlast comparable standard types many times. And response time is just as fast. Furthermore, both sheathing and insulation can be specially selected for resistance to atomic radiation. Conductors in all standard calibrations and various sheath materials are available for temperatures up to 3000° F. If desired, "Ceramo" thermocouples can be completely pre-tested. Conductors—36 to 12 gage. Overall diameters—1/25" to 7/16".

Write for Bulletin 305-R.

**Thermo Electric Co. Inc.**

SADDLE BROOK, NEW JERSEY

In Canada—THERMO ELECTRIC (Canada) Ltd., Brampton, Ont.

Check 2737 opposite last page.



## Wire-Mesh PRODUCTS

for all filtering and  
straining applications. All meshes,  
all weaves, all alloys.

SERVING INDUSTRY  
FOR 76 YEARS

Send Specifications for an estimate. Department 27



**THE C. O. JELLIFF**  
MANUFACTURING CORP.

SOUTHPORT • CONNECTICUT • USA

Check 2738 opposite last page.

## ENGINEERING

### Mixer Info — new approach

In a different approach to catalog information for mixers, manufacturer presents easy-to-use, comprehensive mechanical design information in 68-page catalog which permits selection of complete paddle- and turbine-type fluid mixers. Cat A-27 — Mixer Div., Philadelphia Gear Works, Inc., G Street below Erie Ave., Philadelphia 34, Pa.

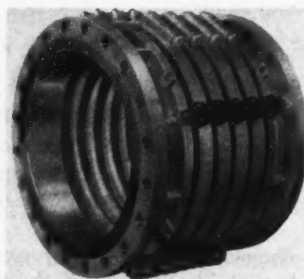
Check 2739 opposite last page.

### Expansion, contraction of pipe systems shared equally

Uses: For all-weather outdoor pipe systems and indoor systems operating on frequent on and off cycles.

Features: Equal distribution of pipe expansion and contraction is immediately transferred by pantograph to all equalizing rings.

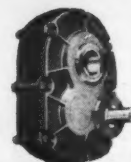
Description: Pantograph neutrals of expansion joints are anchored to unit's end fittings and intermediate equalizing rings. Joints are made from stainless steel in sizes from 3" diameter and for traverses up to 7½" in single



Corrugated expansion joints feature equal distribution of pipe expansion and contraction

or 15" in double unit. Standard units are designed for 150 and 300 psi working pressures, but can be made for higher pressures on request. Joints are available in copper for use with copper or brass piping. Copper expansion joints are available from 3 to 24" diameter in both single and dou-

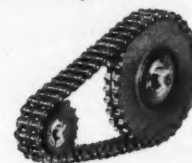
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**PRODUCTS**  
you  
should  
know



**TORQUE-ARM**  
**SPEED REDUCERS**  
Cost less—deliver more!



**TAPER-LOCK**  
**SHEAVES**  
Easy on—easy off! Mount flush!



**TAPER-LOCK**  
**SPROCKETS**  
No reboring—no waiting!

Write for Bulletins!

- ☒ Torque-Arm Speed Reducers. 15 sizes—1 to 100 hp. Bulletin A-637
- ☒ Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661
- ☒ Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644

**DODGE MANUFACTURING CORPORATION**  
6200 Union Street • Mishawaka, Indiana

**DODGE**

of Mishawaka, Ind.

Check 2740 opposite last page.

CHEMICAL PROCESSING

ble units. Max operating pressure for copper expansion joints is 125 psi at 406°F.

(Duo equalizing expansion joints are product of Zallea Brothers, 815 Locust St., Wilmington 99, Del.)

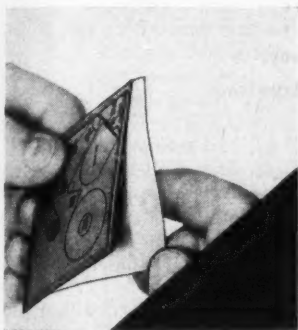
Check 2741 opposite last page.

**It takes five seconds to apply nameplate permanently**

Pressure-sensitive adhesive needs no water or heat

**Uses:** A quickly applied nameplate used to identify, instruct, or inform; for diagrams, schematics, or wherever permanent information is needed.

**Features:** Self-bonding nameplate requires no activation by water, solvent, or heat.



Just remove the liner and apply. The nameplate can be applied in five seconds

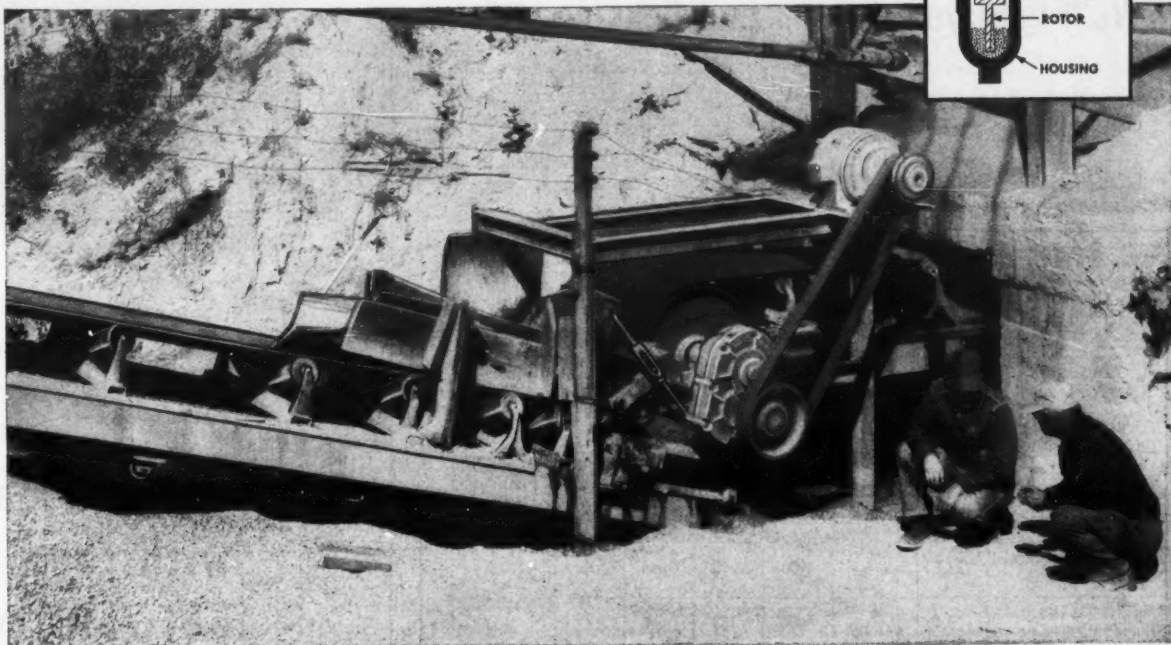
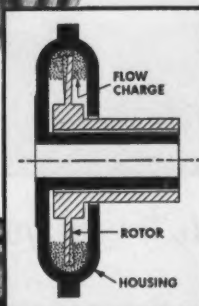
It can be applied in five seconds to metal, glass, plastic, or wood, with painted, smooth, wrinkled, or curved surfaces.

**Description:** Nameplates are made from 0.004" aluminum backed with Permabond pressure-sensitive adhesive. They are available in a wide range of colors — both glossy and matte finish. Plates meet military specifications; MIL-N-25076; MIL-P-6906; and MIL-E-5272A for abrasion resistance, salt spray, and humidity. They stay bonded to surfaces through a temperature range of -62 to 325°F.

(Quick-Plates are products of W. H. Brady Co., 727 W. Glen-dale Ave., Milwaukee 9, Wis.)

Check 2742 opposite last page.

**This new drive starts loads smoothly... with smaller motors ...and gives 100% efficiency at full load!**



**FLEXIDYNE**

THE DRY FLUID DRIVE

This tunnel conveyor, 225 feet long, handles 500 tons of sand and gravel per hour—8 to 16 hours a day.

With Flexidyne, the motor picks up the load easily and smoothly. Power investment is reduced, power costs cut, maintenance simplified and conveyor belts are protected against breakage.

Flexidyne, the Dry Fluid Drive, is the new development that starts loads smoothly, that protects against shocks and overloads, that saves power and that gives 100% efficiency at full load!

The "dry fluid" in Flexidyne is heat treated steel shot. A measured amount, called the flow charge, is contained in the housing, which is keyed to the motor shaft. When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, wedging it between the housing and the rotor which transmits power to the load.

After a momentary slip between housing and rotor, the two become locked together and achieve full

load speed without slip and at 100% efficiency during the running cycle. Changes in weather—hot or cold—inside or out—do not affect operation of Flexidyne.

Flexidyne is now available in 8 sizes—for use with electric motors and internal combustion engines from 1 hp to 300 hp. While each size is power rated, the flow charge can be varied at will to give tailor-made torque for your particular job. Write for Bulletin A-640.

DODGE MANUFACTURING CORPORATION  
6200 Union Street, Mishawaka, Indiana



CALL THE TRANSMISSIONER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in in your classified phone book, or write us.

**DODGE**

of Mishawaka, Ind.

Check 2743 opposite last page.





## We'll pour you a pump that licks corrosion

If you have a problem involving pumps and corrosives, check the table below.

It lists several Goulds pumps you can get with fluid ends in a wide choice of special metals, cast in Goulds foundries.

All the pumps in the chart below are available in all iron, or bronze fitted, or all bronze (zinc free, leaded bronzes), or Ni-Resist, or Nickel Aluminum Bronze—or, as indicated, in Steels and Alloys.

Type of Pump	Described in Bulletin	Sizes—Number and Range	Maximum Capacity GPM	Maximum Head Ft.	Type of Impeller	Will Handle Slurries	Available in STEEL & ALLOYS*
Fig. 3715 Single Stage, Side Suction	725.4	10 ¾"–3"	800	300	Semi-Open	X	X
Fig. 3189 Single Stage, End Suction	720.4	13 1¼"–8"	3000	290	Open	X	In 4", 6", 8" Sizes
Fig. 3405 Single Stage Double Suction	721.6	33 3"–12"	6400	425	Encl.	—	In 6", 8", 10", 12" Sizes
Fig. 3305 Two Stage Opposed Impellers	722.6	8 1½"–4"	1200	1000	Encl.	—	Casings all Sizes—3" & 4" Comp. Pump
Fig. 3135 Paper Stock and Thick Liquids	723.1	16 3"–8"	4000	215	Open	X	X
Fig. 3138-39 Heavy Duty Process Pump	723.4	4 4"–14"	9000	160	Open	X	X

\*STEEL & ALLOYS: All Sand Cast Machineable Alloys such as Low, Medium and High Carbon Steels, CF-8M (316), CN7MCU (Gould-A-Loy 20), CG-8M (317), CF-8C (347), CA-40 (420), Monel, Nickel.

In addition, there's the new Goulds-Pfandler *glassed* pump (Fig. 3708) that stands up for years against acids and alkalis because all surfaces in contact with the liquid are glassed. It's available in four sizes with capacities to 760 GPM and heads to 140 feet. It's described in Bulletin 725.2.

Your Goulds representative will be glad to discuss materials of pump construction that suit your process.

### SEE GOULDS PUMPS AT THE CHEM SHOW



### GOULDS PUMPS, INC.

Seneca Falls, N. Y., Main Office and Works Branches  
ATLANTA, 15 Peachtree Place, N.W.  
BOSTON, Room 314, 1330 Beacon St.  
Brookline, Mass.  
BUFFALO, 5475 Main St.  
CHICAGO, 53 West Jackson Blvd.  
HOUSTON, 2314 Main St.  
NEW YORK CITY, Room 1503, 11 Park Place  
PHILADELPHIA, 2099 North 63rd St.  
PITTSBURGH, Room 512  
Bessemer Bldg., 104-6th St.  
TULSA, 54½ East Apache St., P. O. Box 6157

West Coast Representative: GOULDS PUMPS Western, Inc., 1919 N.W. Thurman St., Portland 9, Oregon  
In Canada: The A. R. Williams Machinery Co., Ltd. . . . in all principal cities

Check 2744 opposite last page.

## PLANT ENGINEERING & MAINTENANCE



Photos By CP Staff

At Peter Hand, fighting moisture is always a problem and floors take a beating. Experience has shown that . . .

## asphalt mastic floors withstand moisture, hot-cold cycles

THEODORE W. WETT, Assistant Editor

With VICTOR ECIMOVICH, Chief Brewmaster  
Peter Hand Brewery Co., Chicago, Ill.

**Problem:** At Peter Hand, floors were subjected to cold in refrigerated areas; heat (up to 180°F), where containers were cleaned; and almost constant moisture from washing operations with attendant temperature changes. In some areas, spills of raw and processed beer exposed floors to liquids with pH running as low as 3 to 3.5.

Thumping and bumping as barrels and kegs (cooperage) came down runways into storage and racking room added an additional wear factor to

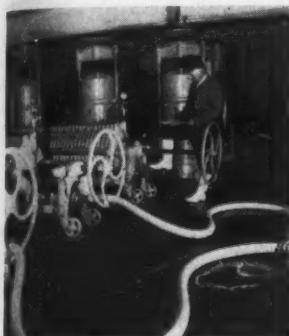
floor's job. Loads up to 350 lb/sq ft were imposed when barrels were stacked.

Water-proofing seal on concrete had not been successful when tested under these adverse conditions. Maintenance costs ran high.

**Solution:** In 1954, when latest addition to Peter Hand's building program was underway, an asphalt mastic floor was chosen for washhouse, racking room, filter room and other problem areas. In racking room, almost entire floor area has cast iron grids em-



Filter room at Peter Hand. Note excellent appearance of floor after four years of constant exposure to moisture and beer spills which can have a pH as low as 3



Variations in temperature have had no adverse effect on mastic floor

bedded in mastic. Top of grids is even with surface so that wear from rolling cooperage will be on grids and not on floor itself. Floor is two inches thick in most areas with a buildup to three inches near walls.

Floors are installed hot (approximately 350°F) and can be placed in service as soon as cool. They are laid monolithic, without joints, and are sufficiently elastic to withstand unequal strains without checking or cracking.

**Results:** Water-proof, wear-resistant, resilient floor has successfully withstood adverse operating conditions imposed by brewing process, packaging, and storage procedures. Maintenance costs in general have been low during four years floor has been in service.

(Asphalt mastic floors were manufactured and installed by Fulton Asphalt Co., 165 W. Wacker Dr., Chicago, Ill.)

Check 2745 opposite last page.

#### Drive selection tables

Folder of four pages contains new selection tables for manufacturer's shaft-mounted drives including new higher ratio units. Selection Tables — The Falk Corp., Milwaukee 1, Wisconsin.

Check 2746 opposite last page.

## Mill scale removal by Dowell started this new plant off with a \$100,000 operating profit



Here's how the management of a multi-million dollar corporation used its knowledge of chemical cleaning to start a new plant off in the right way—in the black.

Following construction, and before the plant was put on stream, Dowell was called in to remove mill scale from the following systems:

- Ammonia Compressors Suction and Discharge Piping • Engine Water-Cooling System • Engine Oil-Cooling System • Engine Jackets • Hydraulic Oil-Cooling System • Oxygen Suction and Discharge Piping • Miscellaneous Piping • Product Lines to Storage • Miscellaneous Towers

The total cost of this mill scaling was approximately \$5,000. But, once in production, this plant did not have a single major shut down for maintenance caused by mill scale. The plant management credits Dowell Service with netting the

plant an operating profit somewhere between 10 and 20 times the cost of the chemical cleaning. This amounted to between \$50,000 and \$100,000 the first year.

This particular case history is about a chemical company, but Dowell has startling performance data to show you—from your own industry. That's because chemical cleaning is so versatile. Dowell engineers are experts in removing scale and sludge from process systems, tanks and piping. They apply solvents in various ways—such as filling, jetting, cascading. Dowell furnishes all the necessary chemicals, trained personnel, pumping and control equipment.

For specific information on how chemical cleaning can help you to greater profits, call the Dowell office near you. Or write Dowell Incorporated, Tulsa 1, Oklahoma.

have Dowell clean it chemically

**DOWELL**

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

Check 2747 opposite last page.

(ADVERTISEMENT)

# E-D Filter Paper Makes Excellent Cover For Cloth Or Other Filter Media

## Provides Greater Clarity Of Filtration And Prolongs Life Of Filter Medium

FILTERTOWN, USA. Field reports prove that there is an increasing use of E-D filter papers, with the greatest demand for grade # 953, as a cover for cloth or other filter media in industrial filtration. To date, this practice has been widely adopted in plants which process oils, including coconut, cod liver, corn, cooking, linseed, soybean, and vegetable oil. These plants manufacture margarine, salad oil and shortening, soaps, paint, varnish, and many other products.

### Great Savings In Time And Money

Actual experience, in hundreds of cases, has proven to the satisfaction of production officials that it is far more economical to cover the cloth or other filter medium with E-D filter paper and then, when the press needs redressing, to simply peel off the paper, discard it, and replace with a clean E-D filter paper cover. Substantial savings in press running time are made.

E-D filter paper holds up solid particles to such a degree that there is often little need for recirculating the slurry to obtain an adequate cake deposit for clear filtration at the start of a cycle.

Moreover, the E-D filter paper protects the filter medium from slimy fines, thus prolonging its useful life, saving additional money on media expenditures. The cost of E-D filter paper is so little, in comparison with the cost of other filter media, that these savings are important.

### Greater Clarity Of Filtrate Obtained

Because of its fine porosity and unique uniformity of furnish, grade # 953—as well as the many other grades of E-D filter paper—obtains exceptional clarity of filtrate. Many

degrees of rapidity and porosity are available in the more than 50 regular grades manufactured by The Eaton-Dikeman Company. Special grades are also made to meet individual requirements.

### Free Samples Available

Actual tests made at the user's plant furnish convincing proof of the many advantages that are possible. Simply write for E-D's Filtration Analysis Report. When the necessary facts are supplied, you will receive several recommended grades, cut to your own size and specifications, at no charge. Make the necessary test runs and you will soon be able to determine the benefits for yourself. There is no charge or obligation for this service.

Write to Thomas H. Logan, Jr., care of The Eaton-Dikeman Company, Filtration, Mount Holly Springs, Pennsylvania for prompt attention.

This company is the only company in America that is exclusively engaged in the manufacture of filter paper for science and industry. Authorized representatives and dealers are located in every section to provide service and helpful information on all problems relating to liquid filtration.

Check 2748 opposite last page.

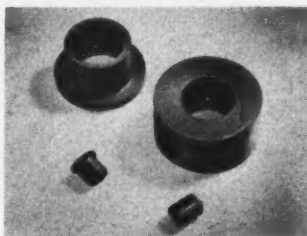
## ENGINEERING

### No lubrication required with Teflon-based bearing material

Resists corrosives; shock  
won't permanently deform

Uses: For dry bearing services, both sliding and rotating, at temperatures up to 500°F.

Features: Teflon-based material is ideal for use with solvents, such as acetone, and practically all types of cor-



Teflon-based dry bearing material resists corrosives, shock deformation, needs no lubrication

rosives. Since it will not permanently deform due to shock, it is excellent for applications subject to impact.

Description: Teflon-based bearing material has static or kinetic coefficient of friction against polished steel of only 0.04, and PV factor of 10,000. It will withstand speeds up to 1000 fpm, and loads to 100 psi.

(Chemloy bearing material was developed by Crane Packing Co., 6400 Oakton St., Morton Grove, Ill.)

Check 2749 opposite last page.

### Designed for 5000 psi, throttling valve has low turning torque

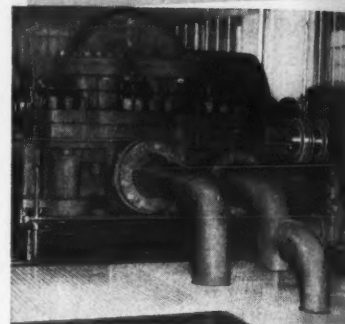
Finger-tip pilot valve control  
regulates all flow

Uses: For controlling flow of liquids at pressures up to 5000 psi.

Features: All flow regulation is through pilot valve, which can be turned with finger tips.

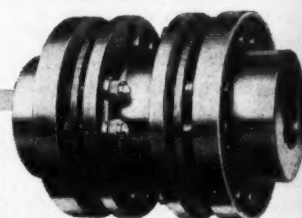
Description: Throttling valve of simple construction is available in 1" (-16) size. Oper-

## THOMAS FLEXIBLE COUPLINGS PROTECT Your Pumps



Pump troubles such as replacement of packing glands and bearings are practically eliminated when Thomas Flexible Couplings are used.

There is a THOMAS Coupling  
for every purpose.



UNDER LOAD and MISALIGNMENT  
ONLY THOMAS FLEXIBLE COUPLINGS  
OFFER ALL THESE ADVANTAGES.

- 1 No Cross-pull on Bearings or Gland.
- 2 No End-thrust on Bearings or Impeller.
- 3 Freedom from Backlash—Torsional Rigidity.
- 4 Free End Float.
- 5 Smooth Continuous Drive with Constant Rotational Velocity.
- 6 Visual Inspection in Operation.
- 7 Original Balance for Life.
- 8 No Lubrication.
- 9 No Wearing Parts.
- 10 No Maintenance.

Write for Engineering Catalog 51-A

**THOMAS FLEXIBLE  
COUPLING CO.**

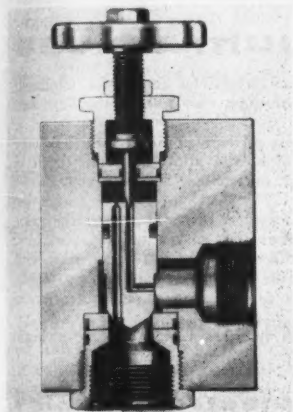
WARREN, PENNSYLVANIA, U. S. A.

Check 2750 opposite last page.

CHEMICAL PROCESSING



ator adjusts only small needle valve to obtain proper flow. Full flow is obtained by only two and one-half turns of pilot valve, yet metering is accurate to 1/100 gallon per minute through entire range of valve. Positive seal is maintained



Finger-tip control of pilot needle valve regulates proper flow

under most critical conditions.

Body is aluminum alloy, with stem, inserted seat, and piston, of hardened stainless steel. Hydraulic oil seals are standard, with other types available. Standard AN adapters may be used to reduce ports to smaller sizes.

(Throttling valve is product of Republic Mfg. Co., 1565 Brookpark Rd., Cleveland 11, Ohio.)

Check 2751 opposite last page.

**Dust-tight, weather-proof motor starter enclosure cast from aluminum alloy**

**Uses:** For motor starters in outdoor or hazardous locations.

**Features:** Dust-tight, weather-proof enclosure is cast from high-density aluminum alloy.

**Description:** Explosion-resisting motor starter enclosure consists of collar section, upper tank and lower tank. Collar sections with or without circuit breaker operating mechanism are available. Plugged and tapped opening in each tank is provided for

**Other Fluoroflex-T<sup>®</sup> Products**



**Chemical-proof flexible joint for severest service**

MOLDED Fluoroflex-T reinforced bellows — a Resistoflex development — become strong links in any system where you need corrosion-proof flexible or expansion joints. Unlike bellows machined from solid stock, molded units have better grain structure, hence, superior flex life.

In one test by a user, Fluoroflex-T bellows were eccentrically flexed for twenty million cycles without fatigue or failure. These units have since been thoroughly time-proved in actual service.

Fluoroflex-T bellows dampen vibration, absorb expansion, correct misalignments...problems especially acute in fragile piping systems. Units can be fabricated for specific installation or operational requirements. Send for details.

**CAUTION:** Because the properties of Teflon products can be varied widely by the fabricating methods employed, the fabricator's experience and integrity remain the user's best assurance of quality and performance.

*Originators of high temperature fluorocarbon hose assemblies*



**A new "end" for corrosion problems in hose**

See how the patented Fluoroflex-T<sup>®</sup> tube is carried through the fittings and formed over the flange face. Here is complete protection against corrosion because fluids cannot possibly come in contact with metal.

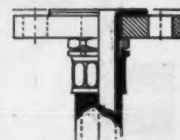
This is the first time chemically inert jacketed fittings have been combined with chemically inert hose in a continuous integral assembly.

Fluoroflex-T flanged hose assemblies eliminate the need for special consideration of the type of metal used in the fittings — either for anti-corrosion or contamination needs. As a result of the continuous smooth bore construction, cleaning problems and entrapment of materials are eliminated for all practical purposes.

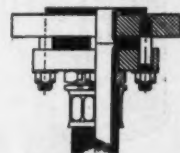
This hose handles active chemicals, solvents, gases and the most corrosive compounds. It is also applicable where vibration is a problem. It is non-aging . . . lasts indefinitely even at 500°F.

Write for data.

®Fluoroflex is a Resistoflex trademark, reg., U.S. off.  
®Teflon is a DuPont trademark.



See how Fluoroflex-T tube is carried through fitting and across face of flange.



For frequent disconnects, a modified construction is available using a secondary Fluoroflex-T jacketed flange. This is replaceable, spares the major assembly from seal-damage.

**Resistoflex CORPORATION**

Roseland, New Jersey • Western Plant: Burbank, Calif. • Southwestern Plant: Dallas, Tex.

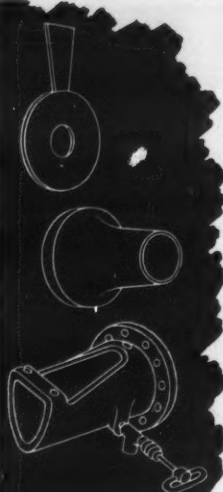
Check 2752 opposite last page.



## Don't Minimize your Primary Devices

They are of utmost importance to the accuracy and dependability of your instrumentation. Burgess-Manning has made a specialty of such devices as: Venturi Tubes—Open Flow, Venturi Insert and ASME Nozzles — Flume Liners, Weir Plates and Orifice Plates, offering you a wide selection including many patented features to provide greatest metering accuracy. Write for complete details.

Also ask for information on Burgess-Manning "Matched Metering" for highest over-all accuracy



**BURGESS-MANNING COMPANY**

PENN. INSTRUMENTS DIVISION

4126 Haverford Ave., Philadelphia 4, Pennsylvania

Instrumentation and Controls  
for water, steam, gases, sewage and industrial wastes

Check 2753 opposite last page.

this **NO-COST TEST** OFFER  
has **CONVINCED** thousands

... send for YOUR FREE  
"TEST CAN" of C-5 "hi-temp"  
ANTI-SEIZE THREAD COMPOUND!

**FEL-PRO**  
C-5  
"HI-TEMP"  
ANTI-SEIZE  
THREAD COMPOUND

**For chemical plant uses**, on all studs and bolts exposed to temperatures up to 1800°F. such as on compressor head assemblies, hot pump studs, autoclaves, reactor flange studs, heaters, heat exchangers, "cat" crackers, stainless steel assembly.

**Try C-5 and see why leading refineries, manufacturers and power producers have made it part of their regular preventative maintenance program.**

- ✓ Ends Seizing and Galling even up to 1800°F.
- ✓ Reduces Wrench Torque
- ✓ Ends Stud Breakage
- ✓ Permits Repeated Re-use
- ✓ Speeds Assembly and Disassembly
- ✓ Protects Stainless Steel at all Temperatures

**1614-CR**

**ANTI-SEIZE THREAD COMPOUND**

**C-5's exclusive colloidal copper formula** separates mating metal threads and surfaces with cushioning, protective copper plating. C-5 prevents galvanic action and eliminates pitting even when dissimilar metals join. On mating metal surfaces, C-5 saves gaskets and countless man hours.

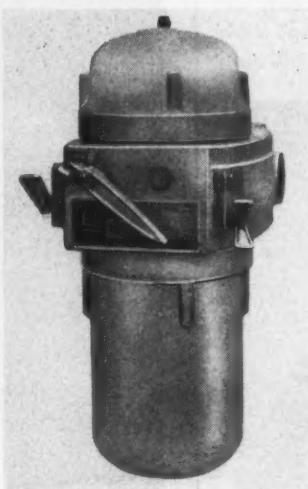
**WRITE TODAY... For Your FREE Test Sample Can of C-5.**

**FELT PRODUCTS MFG. CO.**  
Dept. 54, P.O. Box 8609, Chicago 80, Ill.

**"HIGH-TEMP"**

Check 2754 opposite last page.

## ENGINEERING



Explosion-resisting motor starter enclosure is cast from high-density aluminum alloy

drain and breather. Collar sections have tapped and plugged holes for installation of reset mechanisms, push-buttons, and selector switches. Two sizes of enclosures are available, one for NEMA size 0 or 1 starters and another for NEMA size 2 starters.

(Motor starter enclosure is product of Square D Co., 4041 N. Richards St., Milwaukee 12, Wisconsin.)

Check 2755 opposite last page.

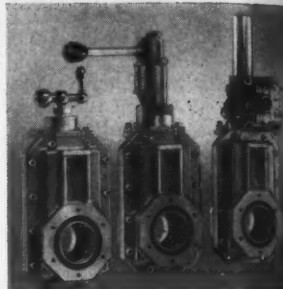
**Bonds of plastic alloy resist shock, water, most chemicals**

**Uses:** For bonding to practically all metals and wide range of non-metals; and for sealing, gap-filling, caulking, seam smoothing, filleting, splining, patching, packing joints, and structural bonding.

**Features:** Material produces durable, high-strength bond that resists shock, water, solvents, and most chemicals. Bond will not shrink, crack, swell, or peel, and will hold through temperature variations from -60 to 200°F.

**Description:** Plastic alloy is composed of metallic and non-metallic reinforcing agents alloyed with specially formulated modified epoxy resin. Alloy is in form of a jet-black

CEC VST Valves:  
throttle, toggle,  
pneumatic



## Compact straight-through high-vacuum valves

Designed especially for high-vacuum systems calling for minimum impedance, these CEC straight-through valves leave the flow area 100% unrestricted when open.

They seal vacuum-tight against pressure in either direction, may be actuated under either condition, and allow materials (such as alloy additions) to pass through unrestricted openings and a short flow path.

Because a cammed rolling mechanism opens and shuts the valve gate without scuffing or wearing the sealing gasket, maintenance is low.

VST valves are available in stock in 2-, 4-, and 6-inch sizes with three operating mechanisms: manual throttle, quick-acting toggle, and pneumatic. Other sizes are available on special order. Prices start at \$99.

Write for Bulletin 10-1 which describes CEC's full line of high-vacuum valves, baffles, traps.

**Consolidated Electrodynamics**



Rochester Division, Rochester 3, N. Y.

formerly Consolidated Vacuum

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES

Check 2756 opposite last page.

**Specify  
KNOX  
TOWER  
PACKINGS**

**PORCELAIN**

**RASCHIG RING**

**Save Time and Money on**

## KNOX Tower Packings

**for Initial Installations as well as Replacements, because**

- Uniform Quality
- Zero Porosity
- Iron Free
- Resists High Temperature, Fumes, Vapors, Corrosion, Alkalies and Acids

- High Strength
- KNOX produces porcelain Tower Packings from same composition as is used for High Voltage Electrical Porcelain

**Further information, prices and samples gladly furnished upon request.**

**KNOX PORCELAIN CORP.**  
KNOXVILLE 1, TENNESSEE

Check 2757 opposite last page.

CHEMICAL PROCESSING

## ENGINEERING

paste which hardens into strong, hard, metal-like substance. Paste is thixotropic, and adheres to vertical surfaces and remains in wide gaps without running, flowing, or sagging, even when heated.

(Resiweld Plastic alloy #600 is product of H. B. Fuller Company, 181 Kellogg Blvd., St. Paul, Minn.)

Check 2758 opposite last page.

### Two-way equal torque, unlimited length in link shaft

Equal flexibility in all sizes

Uses: For remote controls and power drives.

Features: Unit provides equal torque in both directions, unlimited length, and equal flexibility in all sizes from  $\frac{3}{8}$  to 3" diam.

Description: Flexible shaft links consist of trunnion blocks and two half-links fastened together with screws or



Flexible shaft features equal torque in either direction

rivets. Variety of cover materials including armored neoprene hose, non-metallic hose, or semi-rigid tube is available. Minimum link length is three times diameter, and various link lengths can be combined in one shaft using long links for straight runs.

Torque ratings from manual torsional movement are 50" lbs for  $\frac{3}{8}$ " shaft, 200" lbs for  $\frac{1}{2}$ " shaft, and 2500" lbs for  $1\frac{1}{4}$ " shaft. For motor drives at 1750 rpm,  $\frac{1}{8}$  hp requires  $\frac{3}{8}$ " shaft,  $\frac{1}{3}$  hp requires  $\frac{1}{2}$ " shaft, and 1 hp requires  $\frac{3}{4}$ " shaft.

(Flexible-link shaft is product of Clark Flexible Link Shaft Company, PO Box 73, Newton Highlands 61, Mass.)

Check 2759 opposite last page.



## Easily Serviced without Disturbing PIPING—WIRING—ALIGNMENT

The complete drive unit, including the impeller, of this new Type SZ LaBour pump is removable as a unit for replacement or maintenance—leaving piping and motor undisturbed and in perfect alignment.

Although Type SZ is a non-priming pump, its design permits it to handle large quantities of air or gases mixed with the liquid, so that aerated solutions or volatile materials—within reasonable

limits—cause no trouble whatever. The fully open impeller and absence of sealing rings or other closely fitted pumping parts give this pump the ability to move dirty liquids without clogging or loss of efficiency.

LaBour dependability, long the recognized top in the industry, is built into this newest LaBour unit. Practically any requirement as to corrosion-resistant materials can be met.



Full particulars are yours for the asking. Why not write today?

# LABOUR



Check 2760 opposite last page.



*How  
Binks Pumps Paint...*

# **OLIVER DIAPHRAGM SLURRY PUMPS** **in Ceramic Circulating System for Hotpoint**



Handling an abrasive ceramic paint, O.D.S. Pumps, incorporated in the Binks Ceramic Circulating System for multiple spray stations, developed by the Binks Manufacturing Company, Chicago, Illinois, are helping to provide a higher quality product at lower cost in Hotpoint's Range and Refrigerator Enameling Department in Chicago.

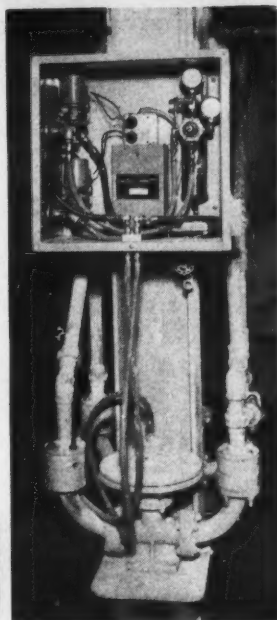
Capable of handling materials ranging from clear liquid to slurries containing up to 60% abrasive solids, the O.D.S. is designed to meet "problem pumping" specifications inherent in applications such as Binks'.

With the diaphragm receiving its impulse pneumatically rather than mechanically, there is *no stuffing box thus no leakage* . . . this link free simplicity can readily be interpreted in terms of reduced maintenance and operating costs. Since maintenance is a prime factor in pumps, why not investigate now all the details of the O.D.S. Pump?

In writing for your free copy of Bulletin No. 5003, tell us about your pumping problem. Dorr-Oliver Incorporated, Stamford, Connecticut.



Check 2761 opposite last page.



## **new literature**

Industrial bulletins pertinent to the reader . . . offering data on products, processes, services. Additional reviews of catalogs, bulletins, data sheet, etc., are found throughout other sections of this magazine

### **Magnetic gage folder**

Pointing up application for plants with dangerous explosive or inflammable conditions, folder describes magnetic gage for liquid levels. Magnetic gage folder — Jerguson Gage & Valve Company, 100 Adams St., Burlington, Massachusetts.

Check 2584 opposite last page.

### **Dust control bulletin**

Bulletin of 16 pages describes and discusses operation of manufacturer's Type-W Roto-Clone dust collector in detail. Wiring diagrams, 23 performance tables, and other valuable data are presented. Bul 274B — American Air Filter Co., Inc., Louisville 8, Ky.

Check 2762 opposite last page.

### **Packaged nuclear plant**

Report of 24 pages describes company's packaged, air-transportable nuclear power plant. Included are conceptual design of remote Arctic installation utilizing such a system, and current status of various design and development efforts. Reactor Report—Nuclear Div., The Martin Co., Baltimore 3, Md.

Check 2763 opposite last page.

### **Halofluorocarbon coatings**

Bulletin of four pages describes advantages of halofluorocarbon dispersion coatings for industrial corrosion control and contamination prevention. "Kel-F" Dispersion Coating System Bul — Dept. B7-227, Minnesota Mining & Manufacturing Co., 900 Bush St., St. Paul 6, Minn.

Check 2764 opposite last page.

### **Cloth marker catalog**

Manufacturer's catalog covers line of markers made from industrial cloth for permanent marking applications. File-type folder includes numbers-letters-signs, wire-pipe-conduit markers, and other self-adhering markers. Product Cat — Westline Products Div., Western Lithograph Co., 600 E. Second St., PO Box 2980 Terminal Annex, Los Angeles, California.

Check 2765 opposite last page.

### **Research and development**

Illustrated brochure of eight pages highlights company's activities in areas of materials research, component development, data instrumentation in ultrasonic and acoustic research. Bul RD-150 — Gulton Industries, Inc., 212 Durham Ave., Metuchen, New Jersey.

Check 2766 opposite last page.

### **NEMA switch standards**

Manufacturer of safety switches offers NEMA Standards bul — Square D Company, 6060 Rivard St., Detroit 11, Michigan.

Check 2693 opposite last page.

### **Detachable containers**

Patented detachable containers, handled by a standard truck equipped with specially engineered hydraulic hoist mechanism, are described and illustrated in manufacturer's 12-page bulletin. Typical uses along with special accessories are shown. Bul 457 — Ingersoll Kalamazoo Div., Borg-Warner Corp., 1810 N. Pitcher St., Kalamazoo, Michigan.

Check 2767 opposite last page.



### Titanium buyer's guide

Containing complete information on titanium alloy Ti-5Al-2.5Sn, not available in previous editions, 52-page buyer's guide presents information on how titanium is made. Specifications, weight tables, and decimal equivalents are included, as well as complete list of manufacturer's titanium products. Buyer's Guide No. 3 — Titanium Metals Corp. of America, 233 Broadway, New York 7, N. Y. Check 2768 opposite last page.

### Top, bottom mixer info

Mixing information and description of equipment are contained in bulletin that covers top- or bottom-entering (turbine-, paddle-, and propeller-types), 1- to 500-hp mixers. Bul 102 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### WANT MORE INFORMATION...

... about things you read about in the New Literature Section?

### Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.



## New blower...its cast Inconel hub takes stresses of 3500 RPM spin in hot corrosives

It spins at 3500 RPM in a fiery, corrosive-gas-laden environment.

That's why this new blower, made by Buffalo Forge Company for a major chemical producer, is made of Inconel\* nickel-chromium alloy parts.

Inconel alloy provides a high combination of strength and corrosion resistance at high temperatures.

**Inco foundry casts critical hub**  
Buffalo Forge took no chances with

the most critical part in the blower. To be sure that exacting specifications were met, they had the makers of Inconel alloy make the hub casting. As long-term customers of Inco's Bayonne, N. J. foundry, they knew they could depend on Inco to produce a sound, uniformly strong casting; one that would bring out the best that was in the alloy.

**Take a tip from Buffalo forge...**  
When you design for extreme condi-

tions, consider the properties of Inconel alloy. And, if the part is to be cast, call on Inco to cast it.

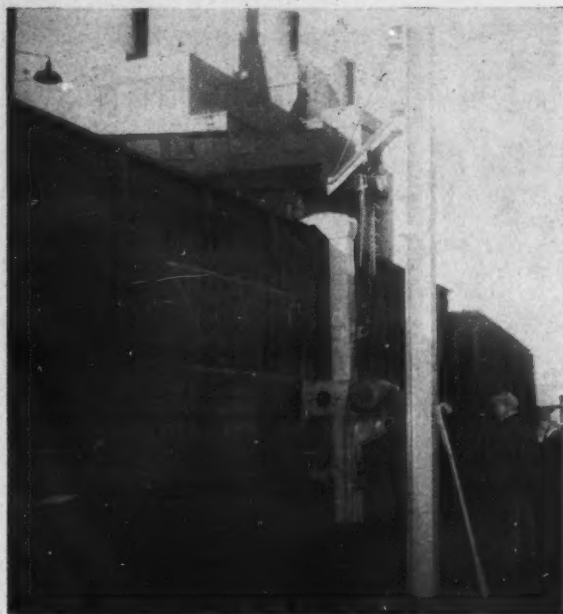
A 9-page Inco technical bulletin, "Engineering Properties of Cast Inconel Alloys", gives the data you need... compositions, physical properties, machining procedures, and much more. We'll be more than glad to send you a copy. \*Registered trademark

The International Nickel Company, Inc.  
67 Wall Street New York 5, N. Y.



## INCO-CAST PRODUCTS

Check 2769 opposite last page.



NATIONAL CAR SHAKER

# UNLOAD...

hopper bottom cars

- quickly
- easily
- safely

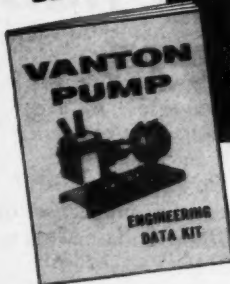
and at low cost

Write for BULLETIN D showing how you can save up to 80% unloading sand, sulfur, ore, and other bulk chemical materials

**NATIONAL CONVEYOR & SUPPLY COMPANY**  
357 N. Harding Ave., Chicago 24, Ill.

Check 2770 opposite last page.

yours  
free!



## SOLVE PUMPING PROBLEMS

NO STUFFING BOX OR SHAFT SEALS

VANTON PUMP eliminates packing problems in handling corrosive or abrasive liquids. Liquid flows in channel between molded plastic body and synthetic liner. Ideal for lab, pilot plant, and full-scale production use. A full-time production tool in the 1/3-20 GPM range.

ENGINEERING DATA KIT contains sizes, pumping and performance data, body and liner materials, selection chart; typical hookups, prices, operating data—all the info. you will need to solve your pumping corrosion and packing problems.

**GET THE FACTS! SEND COUPON!**

Vanton Pump & Seal Corp., Waukegan, Ill. CPQ12  
Division of Cooper Alloy Corp.  
Please send further info. on Vanton pumps.  
My pumping problem is: \_\_\_\_\_  
NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET & NO. \_\_\_\_\_

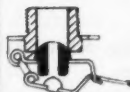
Check 2771 opposite last page.



## Why the UNITRAP\* is Universal



Pilot valve guarantees tight, positive seal



Weight of condensate opens pilot valve. Balanced pressure instantly opens main valve.



Condensate discharges quickly through large orifice.



## The Dual-Valve Automatic Pressure Range 0 to 250 lbs.

• Tremendous Capacity • Fast Warmup • Less Wire Drawing • Reduces water hammer • Reduces trap and parts inventory • Completely universal without changes or adjustments • Pipe Sizes 1/2" through 2". Write for Bulletin 800 C

"WHERE Good Connections COUNT"®

## PERFECTING SERVICE CO.

332 Atanda Ave. Charlotte, N. C.  
Baltimore — Buffalo — Camden, N. J. — Chicago — Cleveland  
Los Angeles — New York — Providence — Montreal — Toronto

Check 2772 opposite last page.

## NEW LITERATURE

### Air-operated valves

Illustrated eight-page bulletin describes company's line of air-operated Saunders patent-type valves. Construction details and operating characteristics are listed. Sizing data and comprehensive listing of flow coefficients are also provided. Bul HB-6 — Conoflow Corp., 2100 Arch St., Philadelphia 3, Pennsylvania.

Check 2773 opposite last page.

### Radiation protection

Bulletin of 4 pages outlines radiation protection services offered by company. Health physics services as package plans or unit services are discussed. Bul 407—Nuclear Science and Engineering Corp., Subsidiary of Norden-Ketay Corp., PO Box 10901, Pittsburgh 36, Pennsylvania.

Check 2774 opposite last page.

### Infrared design problems

In selecting material for an infrared application, various factors must be taken into consideration. Some of these problems and ways in which they are solved are described in four-page bulletin. Bul DE-357 — Servo Corp. of America, 2020 Jericho Turnpike, New Hyde Park, New York.

Check 2775 opposite last page.

### Describes motor scraper

Performance and design features of manufacturer's motor scraper are contained in eight-page illustrated catalog. Specifications are included. Cat MS-1226 — Construction Equipment Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Check 2776 opposite last page.

### Industrial pH handbook

Handbook of 80 pages is first manual published giving such thorough coverage of industrial pH information under one cover. It reviews industrial



## NEW LITERATURE

pH control systems, their principles, application engineering and equipment, and provides convenient reference source on pH for anyone involved in designing, engineering, purchasing, and operating industrial pH systems. Systematically organized and alphabetically indexed, handbook contains approximately 100 illustrations, plus charts, tables, and bibliography of reference literature on pH measurement. To obtain copy of "The Industrial pH Handbook", remit \$2 direct to Process Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.

### Quick-change seals

Bulletin gives complete low-down on quick-change rotary mechanical seals for pressure and vacuum mixing. Bul 111 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### Describes Btu meter

Completely mechanical instrument that measures heat in thermal units and liquid-flow in gallons, with high precision, is in four-page bulletin. Construction, ranges, and operation are described. Bul 1000 — Air Conditioning Equipment Corp., 219 E. 44th St., New York 17, N.Y.

Check 2777 opposite last page.

### Electronic controllers

Illustrated 24-page catalog describes company's line of instruments for electronic testing, control and measurement. Included are detailed design and performance specifications, 22 schematic diagrams, typical application circuits, construction photos, and application summary. Cat B — Keithley Instruments, Inc., 12415 Euclid Ave., Cleveland 6, Ohio.

Check 2778 opposite last page.



## Corrosive fluids won't affect R/M FLEXIBLE THIN-WALL *Teflon*\* HOSE

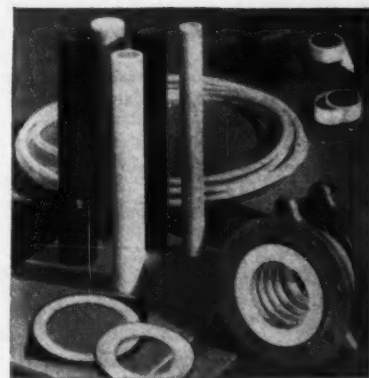
If piping corrosive fluids is your problem, look to R/M Flexible Thin-Wall "Teflon" Hose to provide an easy solution. Impervious to all industrial acids, caustics and solvents, this hose is non-contaminating and nonabsorbent. It will not harbor bacteria. It is relatively impermeable to most chemicals. It is capable of continuous service at 400°F —and keeps its toughness and flexibility at temperatures as low as -100°F.

Standard R/M Flexible Thin-Wall "Teflon" Hose is supplied in two forms: stainless steel wire braided or rubber covered. It is produced in a wide range of inside diameters and wall thick-

nesses. Write us for Bulletin 6700, which gives complete information, or for assistance in the solution to any hose problem.

Raybestos-Manhattan is a pioneer in the application of "Teflon." Other R/M "Teflon" products for the chemical industry include machined parts; rods, sheets, tubes and tape; centerless ground rods held to very close tolerances; stress-relieved molded tubes and rods; gaskets, expansion joints and flexible couplings; bondable tape and sheets for linings; and Raylon (R/M trade name for mechanical grade "Teflon"), which has many characteristics of virgin "Teflon." For complete details, call or write R/M.

\*A Du Pont trademark



## RAYBESTOS-MANHATTAN, INC.

### PLASTIC PRODUCTS DIVISION, MANHEIM, PA.

FACTORIES: Manheim, Pa.; Paramount, Calif.; Bridgeport, Conn.; No. Charleston, S.C.; Passaic, N.J.; Neonah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Engineered Plastics • Asbestos Textiles • Mechanical Packings • Industrial Rubber • Sintered Metal Products • Rubber Covered Equipment  
Abrasive and Diamond Wheels • Brake Linings • Brake Blocks • Clutch Facings • Laundry Pads and Covers • Industrial Adhesives • Bowling Balls

Check 2779 opposite last page.



# DRY AIR... PRECISELY as you want it

- ▶ to control your product's quality
- ▶ to prevent condensation on your product or material
- ▶ to prevent changes due to moist air in contact with your product
- ▶ to protect your material from dampness
- ▶ to protect your processing of moisture-sensitive material
- ▶ to DRY your material or product
- ▶ to pack or store your product safe from moisture damage
- ▶ to get exact moisture control for the precise atmosphere condition you need
- ▶ to provide precise atmospheric conditions for testing
- ▶ to increase your air conditioning capacity
- ▶ to DRY large quantities of fresh air from outdoors

## The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

**Best and most effective because...** it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always.

**Most reliable because...** the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

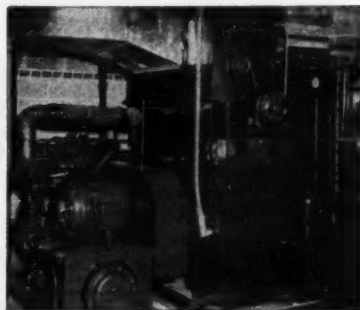
**Most flexible because...** you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

**Easiest to take care of because...** the apparatus is simple, parts are accessible, controls are trustworthy.

**The cleanest because...** no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount

of moisture remaining in the leaving air. Heating or cooling is done as a separate function.



AT THE  
**CHEMICAL SHOW**  
26th EXPOSITION OF CHEMICAL INDUSTRIES  
Coliseum, New York City, December 2 & 3, 1957  
See NIAGARA  
Aero HEAT EXCHANGERS  
Aero AFTER COOLERS • Aero REFRIGERANT  
CONDENSERS • Aero STEAM CONDENSERS  
Aero VAPOR CONDENSERS • HUMIDIFIERS  
HEATERS • COOLERS • DRYERS  
BOOTH No. 655

Write for full information; ask for Bulletins 112 and 121. Address Dept. CP-12

## NIAGARA BLOWER COMPANY

405 Lexington Ave., New York 17, N. Y.

District Engineers in Principal Cities of U. S. and Canada

Check 2780 opposite last page.

## NEW LITERATURE

### Panel meter catalog

Dimensional details and performance specifications for D'Arsonval-type ammeters, millivoltmeters, and voltmeters, as well as AC rectifier type microammeters, milliammeters, and voltmeters are provided in 16-page catalog. Panel Meter Cat — Waters Mfg., Inc., Boston Post Rd., Wayland, Massachusetts.

Check 2781 opposite last page.

### Pipeline conveying

Bulletin of eight pages presents information on manufacturer's system of bulk material handling of all chemicals, sand, etc. through a pipeline. Layout diagrams and photographs illustrate equipment uses. Flo-veyor Bul — Brady Conveyors Corp., 4244 Dempster St., Skokie, Illinois.

Check 2782 opposite last page.

### Custom-built hand trucks

Bulletin of four pages illustrates variety of manufacturer's custom-built hand trucks. Information on what to specify to obtain custom-built hand truck to meet your requirements is included. Cat L-10 — Leebaw Mfg. Co., 65 Wayne Ave., Youngstown, Ohio.

Check 2783 opposite last page.

### Microphotometer data

Company news letter contains detailed description of console comparator microphotometer. Features sought in today's photometric measuring instruments are clearly defined. News Letter, Vol. 2, No. 5, — Jarrell-Ash Co., 26 Farwell St., Newtonville 60, Mass.

Check 2784 opposite last page.

### Thermocouple switches

Key or push-button selector switches for thermocouples or resistance bulb circuits are in four-page bulletin. Two and three-position key switches

and push-button switches are described. Diagrams illustrate switching arrangements. Bul 24-1—Thermo Electric Co., Inc., Saddle Brook, N.J.

Check 2785 opposite last page.

### Propeller-type mixer

Data are presented on top-entering, propeller-type, ¼- to 3-hp mixers in manufacturer's bulletin. Bul 103 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### Valve actuator data

Bulletin of four pages describes electro hydraulic valve actuator. Actuator is designed for use with low level AC or DC signals from electronic controllers and measuring elements or remote positioning devices. Applicability, operation, and description are covered. Bul 38.3—Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill.

Check 2786 opposite last page.

### Condenser Information

Well-illustrated four-page bulletin shows design and technical features of company's line of surface condensers. Units are designed for producing vacuum for prime mover service with large steam turbines. Bul M-571 — Southwestern Engineering Co., 4800 Santa Fe Ave., Los Angeles 58, California.

Check 2787 opposite last page.

### Chemically inert gaskets

Bulletin of six pages describes line of Teflon-fabricated gaskets, back-up rings, and "O" rings impervious to acids, alkalis, and solvents at temperatures from -120 to +500°F. Bul P-327—Crane Packing Co., 6400 Oakton St., Morton Grove, Illinois.

Check 2788 opposite last page.

## NEW LITERATURE

### Cool gasification

Detailed report of 80 pages presents results of research work done on gasification of pulverized coal in suspension with oxygen and steam. To obtain Bul 7 "Gasification of Pulverized Coal in Suspension", remit \$5.00 direct to Institute of Gas Technology, Technology Center, Chicago 16, Illinois.

### Atom lab equipment

Bulletin of 28 pages covers complete line of nuclear laboratory equipment. Data is also included about sample preparation, personnel protection and survey, and counting. Tables give information on detectors compare features of various scalars, and show accessory equipment with which they may be operated. Bul SN — Technical Publications Dept., Tracerlab, Inc., 1601 Trapelo Rd., Waltham 54, Massachusetts.

Check 2789 opposite last page.

### WANT MORE INFORMATION . . .

. . . about things you read about in the New Literature Section?

### Here's How to Get It

Note the number in last line of each new literature review. Check this key number on Reader Service Slip opposite last page of this issue. Fill in the Slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department.

We'll contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.

(ADVERTISEMENT)

### Cavitator® Gas Diffuser Ups Efficiency of Vinegar Processing

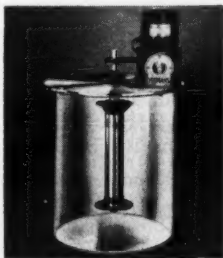
After more than a year of full production testing, a major producer of vinegar tells how Cavitator generation far surpasses former methods.

This Yeomans system produces vinegar by submerged fermentation — aerating dilute alcohol, nutrients, and culture organisms in a tank.

The producer reports that his Cavitator-equipped generator speeds up fermentation, cuts equipment size 90%, permits continuous operation, improves conversion, and eliminates slime.

Basically, a Cavitator is a multi-blade rotor connected to the submerged end of a hollow shaft which is mounted inside a draft tube. Field tests on full scale units show gas (oxygen) absorption efficiencies of 45% to 50%. The Cavitator permits continuous or batch processing in either open or closed systems.

### Test Models Available



Cavitator models for testing or pilot plant operation are available for purchase or rental. Contact the Yeomans Brothers Company, 2003-5 N. Ruby St., Melrose Park, Ill., or their representative.

### Free Periodical on Pumping and Sewage Treatment

The Yeomans Guard is a useful publication concerned with pumping materials and the effective treatment of wastes — both domestic and industrial. It is available to you. A copy of the current issue will be sent to you promptly upon request. Contact your local Yeomans representative, listed in the Yellow Pages of your telephone book under "Pumps" — or write Yeomans direct.

pumping  
something  
special?

↓  
sand  
glass particles  
and other abrasives

ash  
fly ash  
cinders  
bits of coal  
corn cobs  
and other solids  
contained in drainage

potassium cyanide  
sulphuric acid  
jet fuel  
melted naphthalene  
and other  
toxic or volatile  
liquids

molten phosphorous  
acetic acid  
hydrochloric acid  
black liquor  
and other corrosive  
liquids

check these  
special features

available with Yeomans Vertical  
Wet Pit Centrifugal Pumps\*

↓  
Lubri-Vac® reduces by 95% the failure of bearings due to scoring by abrasive particles. Lubri-Vac constantly flushes bearings with lubricant, keeps foreign matter away. (An exclusive Yeomans feature included on all heavy-duty pumps.)

A cradle pump with protective sleeves to protect shaft. Special manganese steel parts. Yeomans pumps including these features will give long life under the most severe abrasive conditions.

Shaft seal is not under liquid pressure with Yeomans Vertical Wet Pit Pumps. This feature eliminates the leakage hazard which is present with horizontal pumps.

Whatever the corrosive and/or abrasive liquid to be pumped—Yeomans has special ferrous and non-ferrous alloy parts to handle it.

\*Vertical Wet Pit Centrifugal Pumps save floor space, require no priming —no costly liquid leaks as stuffing boxes are not under liquid pressure. Capacity range from 5 g.p.m. to 10,000 g.p.m.

## YEOMANS

2003-5 NORTH RUBY STREET, MELROSE PARK, ILLINOIS

☐ Please send me the catalog, "Yeomans Heavy-Duty Wet Pit Pumps."

Name \_\_\_\_\_

Company \_\_\_\_\_

☐ I wish to know how I may see Yeomans' 15 minute film on Wet Pit Pumps.

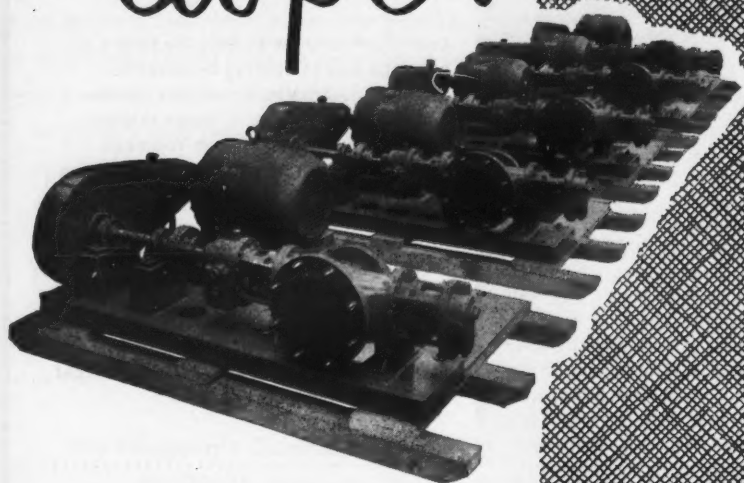
Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Check 2790 opposite last page.



# Here's the dope!



ACETATE DOPE, to be exact. This is the material—with a viscosity at O.T. of 450,000 CP, operating temperature 140°F.—that is being satisfactorily handled by these five

## WARREN

### # 3 1/4 External Gear and Bearing Screw Pumps

together with seven more,  
all built for the Rome plant of

### Celanese Corporation of America

a leading producer of chemical fibers.

These pumps are of special design, with straight-through oversize connections on body; complete with flexible coupling, base, jack shaft, pillow blocks, sprockets, chain guard, and motor with sliding base. Built for variable pressures from 20 to 300 PSIG.

*If you have difficult-to-handle liquids,  
unusual conditions or requirements,  
Warren Engineering and  
Warren Pumps pay off.*



**WARREN PUMPS, INC.**

Warren, Massachusetts

Check 2791 opposite last page.

## NEW LITERATURE

### Pulp and paper data

Manufacturer's series of data sheets on pulp and paper include spray cooler instrumentation, blow tank instrumentation, and dryer control system. Data Sheet Series 260-10, 15, 59 — The Foxboro Co., Foxboro, Mass.

Check 2792 opposite last page.

### Mixers — all types

Condensed catalog illustrates and describes all types of manufacturer's mixing equipment. Bul 109 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### Positioner drives

Principle of operation of pneumatic power drive unit is explained in four-page bulletin. Operating characteristics, specifications, and other data needed to design these devices into control system are included. Bul 1033—Copes-Vulcan Div., Blaw-Knox Co., Erie, Pennsylvania.

Check 2793 opposite last page.

### Electrical stop clock

Detailed description of material, rating, and construction specifications on electrical reset time totalizer are contained in four-page bulletin. Exploded view of device shows design principles. Operating features are explained and applications suggested. Bul PB-691 — Cramer Controls Corp., Centerbrook, Conn.

Check 2794 opposite last page.

### Details gas analyzer

Analyzer for traces of gas in metals is fully detailed in 16-page bulletin which includes uses, features, and specifications. Bul FS-270 — Fisher Scientific Company, 303 Fisher Bldg., Pittsburgh 19, Pa.

Check 2795 opposite last page.

# DOUBLE TROUBLE STOPPED

by **CHEMPRO  
TEFLON\***

In high speed pumps handling highly corrosive chemicals, Chempro Teflon has drastically cut pump down-time caused by scored shafts and short packing life.

## "Scored" Shafts

eliminated by using CHEMPRO TEFLON SEAL CAGES†. Last many times longer than metal lantern rings under continuous corrosive attack. Snap on and off shaft quickly and easily. No vibration at high speeds. Can stand high gland pressures.

† Patented



## Short Packing Life

solved by using CHEMPRO TEFLON RING PACKINGS. Give months of leak-free service compared with days and even hours for conventional packings. Require only slight gland pressure. Low coefficient of friction often makes lubrication unnecessary.



Complete information given in Bulletin CP552

\*duPont Trademark



**CHEMICAL & POWER  
PRODUCTS, Inc.**

9 Broadway, New York 4, N. Y.

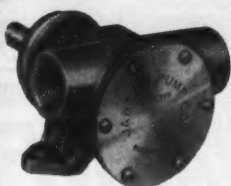
Check 2796 opposite last page.

CHEMICAL PROCESSING



cut pumping costs with

# JABSCO INDUSTRIAL PUMPS



Model 1108  
Cast Iron Construction  
—Sealed Ball Bearings  
—Mech. Shaft  
Seal

- ◀ INSTANTLY SELF-PRIMING
- ◀ SIMPLE, COMPACT, ONLY ONE MOVING PART
- ◀ DURABLE NEOPRENE IMPELLER
- ◀ SELF-LUBRICATED
- ◀ TROUBLE-FREE OPERATION



HERE'S another Jabsco industrial pump — designed and built for chemical, pharmaceutical and other industrial applications. Ideal for transfer of various liquids and acids — sump drainage, coolant pumping, general transfer, pulp in solution, filtering, brines, plating solutions — even fluids containing foreign matter or particles, silt, crystals, and other gritty materials. Bronze, stainless steel or plastic construction is available to solve your specific pumping problems. Pumps either light or heavy viscous liquids. Temperature ranges from 35° to 180° F. Write for a Jabsco factory recommendation for your own needs. Specify application, fluid pumped, temperature, pressure, etc.

FREE — send for catalog sheets, detailed information... no obligation, of course!

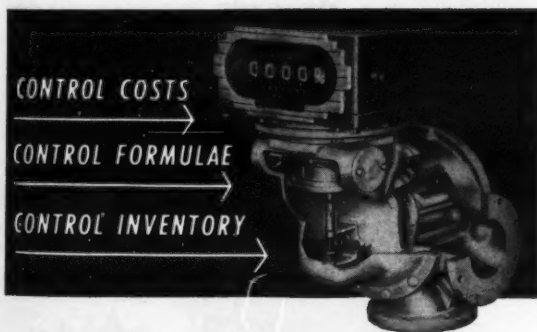
PATENTED AND PATENTS PENDING

## JABSCO PUMP COMPANY

2031 Lincoln Street Burbank, California

Check 2797 opposite last page.

## Stop Liquid Processing Waste



### METER YOUR LIQUIDS AND SAVE!

Want accurate cost controls over liquids used in your plants? Need quality control for your formulations? Are your liquid inventories a problem? Then turn to Rockwell Industrial Meters. Get accurate metered records, quick! Made in a wide variety of sizes, types and materials, including all-stainless steel meters for corrosive services; automatic shut-off models for batching; remote registration for centralized control. Write for bulletin. Rockwell Manufacturing Company, Pittsburgh 8, Pa. Dept. 106M

## ROCKWELL INDUSTRIAL METERS

Check 2798 opposite last page.

## NEW LITERATURE

### Coatings manual

Comprehensive manual of 100 pages contains complete information on protective coating systems for different types of plants, refineries, pipelines, and transportation equipment. For example, coating system is specified for each area of a pulp and paper mill — considering corrosives encountered. Surface preparation, primer, and finish coats are specified for each area of plant. Same information is given for other industries. Among coatings available are catalyzed epoxies, vinyls, chlorinated rubber, butoxy resin, alkyd, and others. Coatings Manual — Industrial Maintenance Headquarters, The Glidden Co., 900 Union Commerce Building, Cleveland 14, Ohio.

Check 2799 opposite last page.

### Lift truck attachments

Mechanical drum-, keg-, and barrel-handling attachments for fork-lift trucks are briefly described and shown in manufacturer's four-page bulletin. Fork-lift Truck Attachment Bul — Little Giant Products, Inc., 1530-50 N. E. Adams St., Peoria, Illinois.

Check 2800 opposite last page.

### Fiber drum data

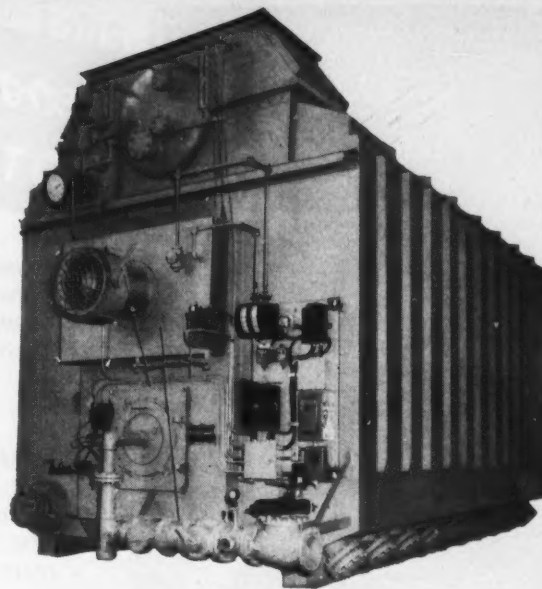
Bulletin of four pages presents complete specifications and illustrates features of manufacturer's fiber drums. Spec sheets — Fibre Drum Div., National Steel Container Corporation, 6700 S. LeClaire Ave., Chicago 38, Illinois.

Check 2801 opposite last page.

### High-vacuum valves

Full line of high-vacuum valves, baffles, and traps are covered in manufacturer's bul 10-1 — Rochester Div., Consolidated Electrodynamics Corporation, Rochester 3, N.Y.

Check 2756 opposite last page.



## Union Packaged Vaporizers produce a wide range of temperatures at low pressure

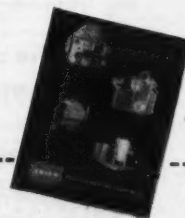
Furnished as a packaged unit completely assembled, piped and wired with controls mounted, this Union Type MH Dowtherm Vaporizer plays an important role in producing phthalic anhydride for a major coke and chemical concern. Equipped for gas firing, it has a capacity of 11,000,000 BTU/hr at 650° F.

Its compact, divided tube bank design assures uniform gas flow across the heating surface. With greater heating surface per BTU provided, correct fluid temperatures are maintained at all times.

Outfitted for heating with oil, gas, waste heat or special fuels, Union Vaporizers (both packaged and field erected) can be installed indoors or out to provide a wide range of accurately controlled temperatures at low pressure.

Union also produces a complete line of Process Heating Equipment for use with Dowtherm "A" and "E", Paracymene, Anisole, Aroclor #1248 and Heat Transfer Oil, either convection or forced circulation.

For detailed information, mail the attached coupon.



### UNION IRON WORKS

1555 Cascade St., Erie, Pa.

MAIL your illustrated Process Heating Bulletin DV to us, without obligation.

NAME	TITLE
FIRM	
STREET	
CITY	ZONE STATE

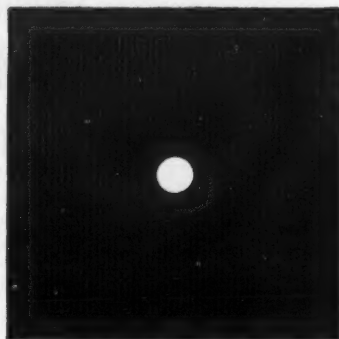
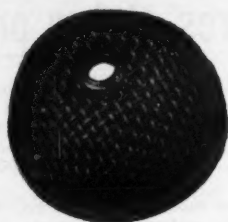
Check 2802 opposite last page.

# Anti-Corrosive WIRE CLOTH

- STAINLESS STEEL
- "NICHROME"
- "MONEL"
- PHOSPHOR BRONZE

for

- FILTER CLOTH
- SPECIAL PARTS
- STRAINERS
- SIEVES
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Are you using wire cloth or wire cloth parts which must be corrosion resistant? Are the service conditions in your plant really tough? If you have a problem selecting the proper anti-corrosive alloy, Newark Wire Cloth may have the answer.

Available in all corrosion resistant metals, Newark Wire Cloth is accurately woven in a wide range of meshes, ranging from very coarse to extremely fine.

If you have a wire cloth problem involving corrosion, please tell us about it . . . we may have the answer.

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for ACCURACY

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Send for Catalog #

**Newark  
Wire Cloth  
COMPANY**

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Check 2803 opposite last page.

## NEW LITERATURE

### Pulverizer operation

Construction and operation features for control of ultra-fine pulverizing, classifying, and conveying in one continuous cycle, along with cutaway views and circuit diagrams, are detailed in 4-page bul. Pulverizer Bul — Schutz-O'Neill Co., 345 Portland Ave., Minneapolis 15, Minnesota.

Check 2804 opposite last page.

### Rubber reclaiming

Process for reclaiming rubber is discussed in illustrated 13-page booklet. Feature of process lies in fact that rubber can be reclaimed to high standard in 24 minutes instead of 24 hours required by conventional methods. "The Reclaimator"—US Rubber Reclaiming Co., Inc., PO Box 365, Buffalo 5, N. Y.

Check 2805 opposite last page.

### Centrifugal compressors

Bulletin of 24 pages gives construction details, application data, and dimensions of centrifugal compressors for gas processing work. Capacities range from 1,000 to 100,000 cfm. Bul C-83—The Cooper-Bessemer Corp., Mt. Vernon, Ohio.

Check 2806 opposite last page.



"I'll see your compressor and raise you number 17 storage tank."

**quality  
proved**

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CASTERS AND WHEELS



**RUBBER TREADS . . .** a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

**RUST-PROOFED . . .** by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

**LUBRICATION . . .** all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Quick grease-gun lubrication provides easy maintenance.

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Check 2807 opposite last page.

CHEMICAL PROCESSING



# Corrosion Conquered

by

## Van-Cor DUCTS

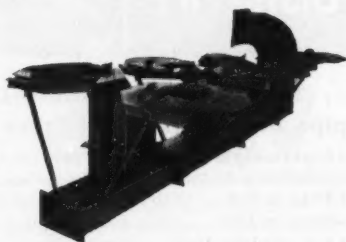


**OLD METHOD**—To exhaust fumes from their plating department, a bearing manufacturer used metal coated ducts. Corrosion destroyed them in eight months.

**NEW METHOD**—Van-Cor Ducts shown above have already served three years—*four times longer*—and are as good as new!

An unplasticized polyvinyl chloride, Van-Cor has licked scores of corrosion problems. Van-Cor is fabricated into ducts, hoods, chemical tanks, stacks, etc. Also available in pipe, fittings and valves. Both Chemically Resistant and Impact Resistant types. Van-Cor has only half the weight of aluminum, yet has high tensile strength.

*Intricate Van-Cor hood and duct for exhausting acid fumes while reclaiming precious metals. Previous duct materials were replaced every two months. This Van-Cor fabrication is over two years old.*



### INVESTIGATE!

Write for Bulletin, Specifications and Name of Nearest Distributor.

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**COLONIAL PLASTICS MFG. CO.**

SUBSIDIARY OF THE VAN DORN IRON WORKS CO.  
2685 EAST 79th STREET • CLEVELAND 4, OHIO

Check 2808 opposite last page.

## NEW LITERATURE

### Mixing from side

Manufacturer's bulletin gives details on side-entering, 1- to 25-hp mixer line. Bul 104 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### For temperature control

Illustrated brochure of four pages lists variety of manufacturer's temperature control equipment. Industrial batch ovens, mechanical convection ovens, and industrial and laboratory furnaces are included. Bul 5510-A Blue M Electric Company, 138th & Chatham St., Blue Island, Illinois.

Check 2809 opposite last page.

### Laboratory apparatus

Catalog of manufacturer's laboratory apparatus containing 1008 pages is thumb-indexed, speedexed, and sub-indexed, with many reference tables, comparison charts and other buying aids throughout. Cat 7 is available on letterhead request from Will Corporation, Rochester 3, N. Y.

### Nuclear services

Brochure describes organization and activities of corporation offering engineering design and consulting services in field of nuclear technology. Background of staff members are listed. Brochure — Internuclear Co., 7 N. Brentwood Blvd., Clayton 5, Mo.

Check 2810 opposite last page.

### Perforated metals catalog

Booklet of 114 pages illustrates and lists dimensions of manufacturer's line of perforated metals for many applications. Perforated Metals Cat — Standard Stamping & Perforating Co., 3131 W. 49th Pl., Chicago 32, Ill.

Check 2811 opposite last page.

## Jobs for plastisols become BIGGER!



Photo courtesy Kaybar, Inc.,

Interior of this large fume scrubber was sprayed with Unichrome Plastisol. The thick vinyl coating withstands acids, alkalies, and many other corrosives. Being pore-free and seamless, the Unichrome Plastisol lining is now preferred for many jobs where rubber or plastic sheet linings were used formerly.

Note that sheer size is no longer a hindrance in applying plastisols. Firms with ever-expanding facilities are located at key points and can handle big jobs economically, quickly.

Plastisols conform to irregular surfaces without air pockets. The coatings stick tight, have good flexibility to absorb mechanical shock, resist abrasion.

Send for bulletins — or name of nearest applicator of Unichrome Plastisols.

PLATING MATERIALS  
ORGANIC COATINGS  
TIN & TIN CHEMICALS  
CERAMIC MATERIALS  
WELDING SUPPLIES  
METALS & ALLOYS  
HEAVY MELTING SCRAP

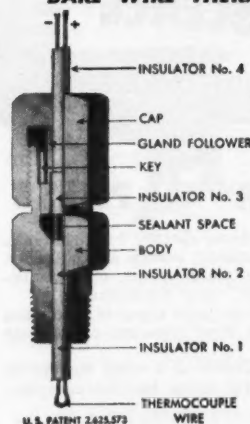


**METAL & THERMIT**  
CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY  
Pittsburgh • Atlanta • Detroit • East Chicago • Los Angeles  
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Check 2812 opposite last page.

## Fast Response conax® BARE WIRE THERMOCOUPLE GLANDS



**provide the only simple, positive method for sealing two or more bare wires at pressures from full vacuum to 20,000 psi.**

Low mass, unshielded, bare wire thermocouples give almost instantaneous response to temperature changes assuring greater accuracy of measurement and control.

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**conax corporation**  
2314 Walden Ave., Buffalo 25, N.Y.

Check 2813 opposite last page.



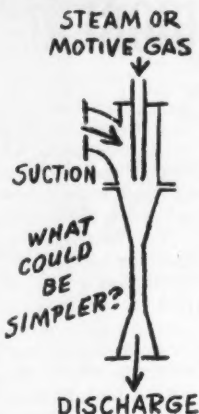
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As simple and sturdy as a piece of pipe, the I-R Ejector offers real economy and dependability for a wide range of applications.

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Check 2814 opposite last page.

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Check 2815 opposite last page.

## NEW LITERATURE

### For portable mixing job

Features and applications of portable mixers, 1/2 to 3 hp, are listed in bulletin that contains full description. Bul 108 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### H<sub>2</sub> isotope properties

Bibliography lists 720 articles published in 1953-1954 on properties of deuterium and tritium compounds. To obtain National Bureau of Standards' Circular 562, Supplement 1, remit 25c direct to Superintendent of Documents, US Government Printing Office, Washington 25, D.C.

### Vulcanized fiber container

Catalog of 16 pages describes company's complete line of material handling containers constructed of vulcanized fiber. Uses, sizes, colors, and features are listed. "CDF Material Handling Containers" — Continental-Diamond Fibre Corporation, Newark, Del.

Check 2816 opposite last page.

### Describes conveyors

Manufacturer's line of conveyors for normal and special applications are described in 36-page catalog with visual indexing system. Attention is given to conveyor accessories. Conveyor Catalog — Pioneer Engineering, 3200 Como Ave., Minneapolis 14, Minn.

Check 2817 opposite last page.

### Air-cleaning equipment

Two of manufacturer's models of air-cleaning equipment are described and illustrated in eight-page bulletin. Capacity and dimension charts are included. Bul-1460 — Sturtevant Div., Westinghouse Electric Corp., 200 Readville St., Hyde Park, Boston 36, Mass.

Check 2818 opposite last page.

## ON THE SPOT HEAT to your exacting requirements!



## TRENT STRIP HEATERS

for Ovens, Dryers, Kettles, Process Equipment

- Flat Metallic Tube Casing
- No Grooves—No Heat Distortion
- Ceramic Block Terminal Blocks
- Sealed End Construction

Available in a complete range of types and sizes, wattage requirements, and voltage conditions—for maximum safe surface temperatures of 750°F. and 1000°F!



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- Brass or Steel Sheath Construction
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Standard sizes from 1/4" to 1 1/4" diameter, and 1 1/2" to 22" in length, are supplied in a range of wattage requirements for 110 and 220 volt operation.

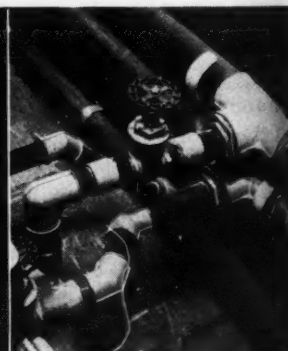
Discuss your spot heating requirements with a Trent representative.

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Check 2819 opposite last page.

## Cut Down Replacement Costs with REPUBLIC SRK PLASTIC PIPE



... the tough, corrosion-resistant plastic pipe that offers all of these advantages:

- **Lightweight**... one man can carry three 20-foot lengths of 4" pipe.
- **Easy to Cut**... with ordinary handsaw.
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- **Non-Toxic**... absolutely safe for water.
- **Immune to Sunlight**... carbon-black blocks ultraviolet rays.
- **Combines with Steel Pipe**... with easy-to-use special fittings.

Get complete data on cost-saving Republic Semi-Rigid Kralastic Pipe. Write today.

## REPUBLIC STEEL

3720 East 45th Street • Cleveland 27, Ohio



Check 2820 opposite last page.

CHEMICAL PROCESSING

## NEW LITERATURE

### Gas chromatography data

Manufacturer's quarterly, designed to help with analytical problems, discusses two or three problems arising in gas chromatography in each issue. Column is devoted to interesting questions on special problems, and information is presented on manufacturer's accessories and improvements. "The Aerograph Research Notes" — Wilkens Instrument & Research, Inc., PO Box 313, Walnut Creek, California.

Check 2823 opposite last page.

### Wind recording system

Bulletin of four pages describes wind-speed and-direction recording system. Installations are shown, and suggestions concerning applications are presented. Engineering specifications and details as to accuracy and sensitivity are included. Form F-457 — Beckman & Whitley, Inc., 960 East San Carlos Ave., San Carlos, California.

Check 2824 opposite last page.

### Glycerine by fermentation

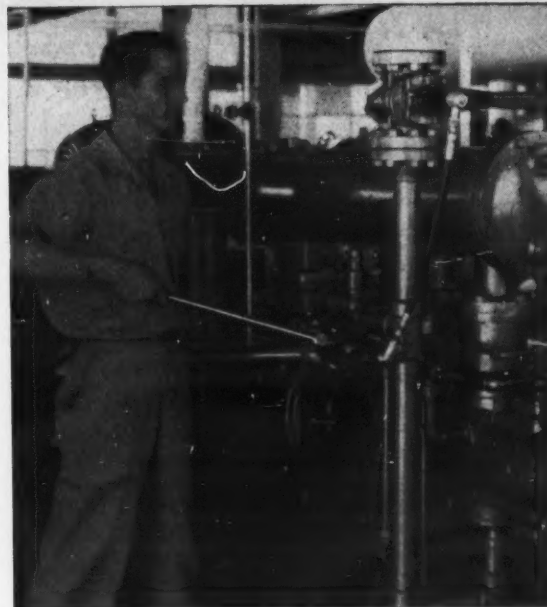
New process for producing glycerine by fermenting molasses is illustrated and described in eight-page bulletin. Flow sheet shows feed stocks and products, including by-products. A brief comparison is made of the process with synthesis of glycerine from petroleum sources. SD case histories — Scientific Design Co., Inc., 2 Park Ave., New York 16, New York.

Check 2825 opposite last page.

### Describes pH meters

Producer of practical pH meters and electrodes for laboratory, plant, or field, presents catalog describing products and listing dealers. Data file L-32-11 — Scientific Instrument Division, Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.

Check 2563 opposite last page.



## REPLACE VALVE SEATS IN SECONDS

### Save Money, Down Time and Maintenance

The man in the photo above is actually replacing seating surfaces on a Rockwell-Nordstrom valve while the valve is in service. Usually, when a valve seat wears slightly it means down time for repairs and replacement. Rockwell-Nordstrom lubricated plug valves eliminate this cost because the seating surface between plug and body is a film of *pressurized lubricant*. Each time the valve is lubricated, the seat renews itself. And unlike ordinary metal seats, the tough plastic lubricant resists cutting or corrosion even on "hard to handle" services. Lubricant saves further by reducing wear for longer valve life at lower cost.

Available in a *complete* line of sizes and pressures. Rockwell-Nordstrom valves cost no more to buy—often less—than ordinary valves. Write for complete details. Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.



**ROCKWELL-Nordstrom VALVES**  
Lubricant Sealed For Positive Shut-Off

Check 2826 opposite last page.

WHEN SPECS CALL FOR...

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Chemical Processing Industry  
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Save on transportation costs, manufacturing time and put yourself in a more competitive position by contacting an experienced "on the spot" source when planning the procurement of process and plant equipment for the West Coast. Send prints for prompt quotation on your next job.

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3670 E. Marginal Way • Seattle 4, Wash.  
*Craftsmen in steel plate and alloys up to 1"*

Check 2821 opposite last page.

## High Quality Stainless Steel Fabrication To Your Specifications by Portersville



**Facilities** — We fabricate in sizes up to 12' diameter by 40' length. All production employees members of United Steel Workers of AFL-CIO.

**Other Materials Fabricated** — Carbon steel, stainless clad, magnesium, monel, inconel, nickel and aluminum.

**Typical Fabrications Handled** — Pressure vessels, reactors, jacketed kettles, heat exchangers, piping, valves, transportation tanks, storage tanks, vacuum vessels.

For estimates submit your drawings to...

**Portersville Stainless Equipment Corp.**  
Portersville (Butler County) 10, Pa.

Check 2822 opposite last page.



## Neff & Fry Silo used for calcined coke

Many of our silos are currently being erected for handling and storing calcined coke. Scores of them have been in use for the same purpose over the years. The photograph shows one such installation in Pennsylvania. It is 24 ft. dia. x 60 ft. high.

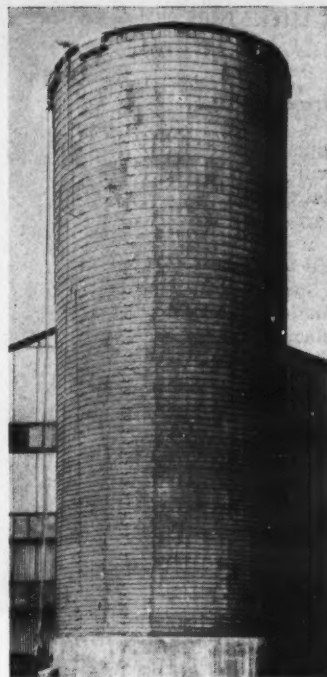
There are a number of special problems in designing systems for handling calcined coke and other materials of similar consistency. Our knowledge of the subject can be of great practical value. We'll be glad to communicate or confer with you.

Our silos are constructed of Super-Concrete Staves with diagonal ends which permit steel hoops to impinge directly upon the horizontal joints. As many intervening hoops are installed as needed to met the lateral thrust of the contents. This is clearly explained in our folder, "Bins With the Strength of Pillars." A copy is yours for the asking.

Not exported except to Canada  
and Mexico.

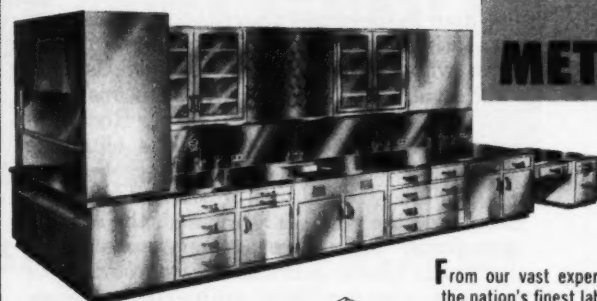
**THE NEFF & FRY CO.**  
166 ELM ST., CAMDEN, OHIO

Check 2827 opposite last page.



**SUPER-  
CONCRETE STAVE  
STORAGE BINS**

## IMPROVE YOUR LABORATORY with MODERN, FUNCTIONAL, EQUIPMENT

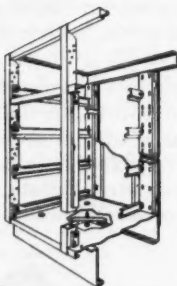


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Cutaway view of our standard base unit: This construction technique permits you to interchange drawers and cupboards by utilizing the same base cabinets as your laboratory requirements change.

METALAB mass-production methods, which have been adapted to custom laboratory equipment and furniture results in "custom" quality units at "standard" prices.



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Please visit us in Booth 356 at the Chemical Show, New York Coliseum, December 2nd through 6th.  
Check 2828 opposite last page.

## NEW LITERATURE

### Hydraulic pump data

Bulletin of 16 pages lists performance data, pump and motor combinations, and installation diagrams of manufacturer's hydraulic pumps. Line of small, high-speed gear pumps and servo systems for positioning are also shown. Bul 810—Eastern Industries, Inc., 100 Skiff St., Hamden, Connecticut.

Check 2828A opposite last pg.

### Instrument air dryer

Adsorptive-type, automatically regenerated dryers for instrument air, with capacities to 125 standard cfm at 90°F and 100 psig, are described in four-page bulletin. Specifications and sizing nomograph are included. Bul 857 — Anders-Lykens Corporation, Div. of Milton Roy Company, 1328 East Mermaid Lane, Philadelphia 18, Pennsylvania.

Check 2829 opposite last page.

### Limits fuel oil corrosion

A development of new liquid-type, oil-soluble chemical which may be added to Bunker C and other heavy fuels to make them less corrosive when burned in diesel engines, gas turbines, and under boilers is discussed in two-page reprint of tech paper. Reprint of tech paper on additive Barsad — R. S. Norris Associates, PO Box 306, Larchmont, New York.

Check 2830 opposite last page.

### X-ray spectrograph data

Bulletin of eight pages gives complete information on manufacturer's improved, automatic indexing X-ray spectrograph. What does it do, how does it function, how is it applied. Bul RC-211 — Instruments Div., Philips Electronics, Inc., 750 South Fulton Ave., Mount Vernon, N. Y.

Check 2831 opposite last page.

From  
Arsenic Trioxide,  $As_2O_3$   
To  
Zinc Chloride,  $ZnCl_2$

## FIGHT CORROSION with TUFF-TUBE

Fiberglass-Reinforced  
Pipe & Tubing

TUFF-TUBE is the most effective plastic material available to fight corrosion in the chemical, petrochemical, and food processing industries.

Resists thousands of highly corrosive chemicals (acid & alkali), solvents, gases, compounds.

Excellent thermal and electrical insulation. Eliminates problem of electrolysis.

Withstands temperatures up to 300°F and extreme thermal shocks.

Non-magnetic and non-sparking

Requires no maintenance after installation

One-sixth the weight of steel, easily handled on the site.

Smooth inner walls and concentric inside unobstructed, fast moving flow.

Standard lengths to 10 ft. Tubing diameters down to 1/16 in. Pipe sizes up to 4 in. Wide range of wall thicknesses.

A really tough material—will not weather, rot, or age under severe environmental conditions.

For a one-foot length of laboratory tubing or a one-mile underground pipe, TUFF-TUBE is available for your process operation. And you can expect real savings in three ways—original purchase, easy installation, minimum maintenance.



**LAMTEX**  
INDUSTRIES, INC.  
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Check 2832 opposite last page.  
CHEMICAL PROCESSING



faster,  
lightweight

## HYDRAULIC PIPE BENDER

GREENLEE NO. 880

Bends pipe or conduit 90° with one ram stroke

Handles 1/2-in. to 2-in. pipe or conduit  
Rugged aluminum alloy construction slashes weight

Every bend perfectly uniform  
One man easily carries and operates it anywhere

Separate two-speed hand pump and ram give faster handling and setup

Operates with fast GREENLEE 798 Power Pumps

Thin-wall conduit, tubing, and bus bar attachments available

Write for illustrated Bulletin E-217

Also: Ask about the new GREENLEE No. 884 Hydraulic Pipe Bender . . . bends pipe and conduit up to 4" full 90° in one fast stroke.

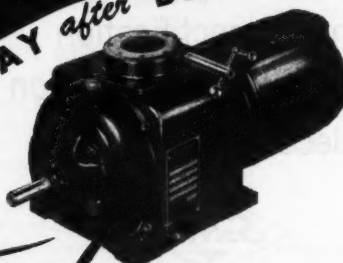
GREENLEE

GREENLEE TOOL CO.  
2392 Herbert Ave., Rockford, Ill.

Check 2833 opposite last page.

WHEN YOUR VARIABLE SPEED DRIVE  
MUST MAINTAIN PRE-SET SPEED

DAY after DAY



**Graham**  
most reliable variable speed drive made

- **ULTIMATE IN SIMPLICITY and COMPACTNESS** — only the Graham is a straight line extension of a standard induction motor — or available without motor.
- **UNLIMITED SPEED RANGE** — from any desired maximum speed to zero, including reverse if wanted without stopping motor.
- **UNMATCHED ACCURACY** — of speed setting and resetting and speed holding.
- **NO PERISHABLE PARTS** — such as belts or tubes, requiring periodic replacement.
- **PROVED PERFORMANCE** — twenty years satisfactory use as standard equipment.
- **LOW COST** — a better job for less money.

**GRAHAM TRANSMISSIONS, INC.**

DEPT. C P

MENOMONEE FALLS WISCONSIN

Check 2834 opposite last page.

### NEW LITERATURE

#### AEC reports price list

Cumulative listing covers more than 4500 AEC research reports. List includes new documents acquired since December 31, 1956. To obtain "AEC Research Reports Price List No. 28," write direct to Office of Technical Services, US Department of Commerce, Washington 25, D.C.

#### Metal laminate facts

Book of eight pages presents interesting facts on manufacturer's metal laminates, including information on bi-metal tube sheets and duplex tubes. "Bridgeport Metal Laminates" — Bridgeport Brass Company, Bridgeport 2, Conn. Check 2442 opposite last page.

#### Pellet cooler, dryer

Complete information on construction, operation, and installation of pellet cooler and dryer with conveying system is presented in four-page bulletin. All details are shown on scale drawing. Bul 177 — Sprout, Waldron & Co., Inc., Muncy, Pa.

Check 2835 opposite last page.

#### Industrial-truck battery

Features of manufacturer's storage battery for electric industrial trucks are outlined in four-page pocket-size folder. Storage Battery Folder — Edison Storage Battery Div., Thomas A. Edison Industries, West Orange, N. J.

Check 2836 opposite last page.

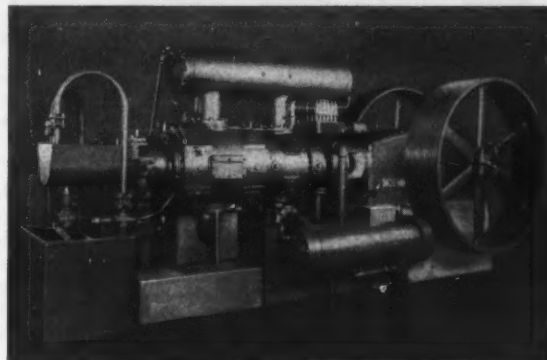
#### Fabricating services

Company's facilities and scope of service to chemical processing industry in custom fabrication of steel plate and alloys up to 1" thickness are covered in detail in four-page bulletin. Bul B-7 — Puget Sound Fabricators, Inc., 3670 E. Marginal Way, Seattle 4, Washington.

Check 2837 opposite last page.

# NORWALK

## HIGH PRESSURE COMPRESSOR



The five stages on this heavy-duty tandem compressor require less horsepower and develop less heat than in four stages in producing 3000 lb. per square inch pressure in capacities up to 31,000 cfh.

Frames with double row roller bearings, reversible ring plate valves, force feed lubrication, generous intercooler coils are some of the features that make this horizontal compressor compact, sturdy and efficient to operate and maintain.

Every Norwalk compressor is test-run for eight hours at the factory, then taken down for complete inspection before re-assembly and shipment.

Norwalk makes compressors from single stage to six stages, from 125 to 25,000 lb. psi. Catalog on request.



## NORWALK COMPANY, INC.

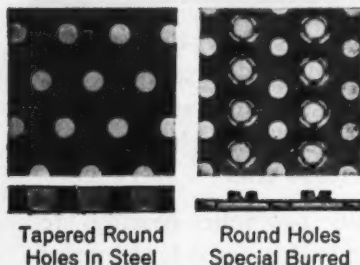
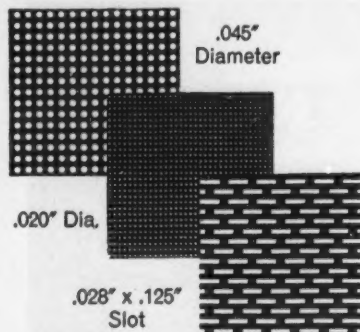
SOUTH NORWALK, CONNECTICUT

Established 1864

Check 2838 opposite last page.

# H & K Perforated Screens

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MADE FOR LONG LIFE**



We are well-experienced in the perforating of screens in stainless steels, monel metal and other alloys.

Screens can be cut to shape or size with margins or unperforated areas as required. Perforated screens can be furnished in practically any material from foil thin to 1" thick.

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☐ STOCK LIST of Perforated Steel Sheets

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COMPANY \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

Check 2839 opposite last page.

## NEW LITERATURE

### High-voltage power

Operation, uses, and detailed electrical and mechanical specifications of high-voltage DC rectifier are covered in data sheet, Form 3000-7—The Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio.

Check 2840 opposite last page.

### Small-batch mixing

Mixers for laboratory and small-batch production are covered in bulletin that also provides latest mixing information. Bul 112—Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, New York.

Check 2427 opposite last page.

### High-vacuum valve data

File folder of 32 pages lists uses, features, and dimensions of over 250 different types and sizes of high-vacuum valves. Bul V2—NRC Equipment Corp., subs. of National Research Corp., 160 Charlemont St., Newton Highlands 61, Massachusetts.

Check 2841 opposite last page.

### Metering case histories

Cost-saving metering information, including number of successful case histories, is contained in 12-page bulletin. Various meters are described, and maintenance rules and installation suggestions are included. Bul NI-57—Neptune Meter Co., 19 West 50th St., New York 20, N.Y.

Check 2842 opposite last page.

### Lab equipment

Manufacturer's catalog of 20 pages describes and lists specifications, of autoclaves, homogenizers, dryers, balances, and temperature recorder. Cat 57-9-67—Burrell Corporation, 2223 Fifth Ave., Pittsburgh 19, Pennsylvania.

Check 2843 opposite last page.

# AJAX LO-VEYORS

are cutting costs



Plant layout men know that materials flow lines are never a static affair. That's why more and more AJAX LO-VEYORS are being used to give maximum flexibility to operations in large plants and small plants, indoors and outdoors.

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WESTFIELD, N. Y.

Check 2844 opposite last page.

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**efficiency** — up to 96%

Literature on Request

Dept. CP-12

## SEL-REX CORPORATION

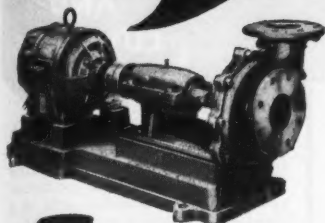
NUTLEY 10, NEW JERSEY (Offices: Detroit, Chicago, Los Angeles)

Check 2845 opposite last page.

CHEMICAL PROCESSING



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DEPENDABLE  
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SSV PUMPS**

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You're sure of maximum service and output with minimum maintenance or production down time with Frederick SSV Centrifugal Pumps because each pump is custom-made to fit your particular operation—whatever the consistency or type of liquid you're moving.

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- Pump sizes from 1" to 4" discharge openings.
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- Pump speeds can be varied to suit the driving media and operating conditions.

**CONSTRUCTION ADVANTAGES**

Pump casings are vertically split for easy accessibility. Mounted on a swivel to permit placing discharge in any desirable position. Pump openings, both suction and discharge, flanged to permit easier connection and disconnecting to joints. One-piece impellers, securely attached to shaft by stout key and lock nut, or threaded, give long service. Pump bearings mounted in sturdy frame horizontally split for easier accessibility. Extra long stuffing box provides for oversize stuffing. Mechanical seal also available for minimum leakage. Pump coupling flexible for direct connection to drivers or can be arranged for belt drive. Pump speed, pump openings, etc. are selected to suit your particular requirements.

Write for Bulletin No. 107



**FREDERICK IRON AND STEEL, INC.**  
FREDERICK, Md. 21700 MARYLAND

Check 2846 opposite last page.

**NEW LITERATURE**

**High-vacuum stills**

Diagrams and descriptions cover company's molecular and high-vacuum stills. Flow diagrams and calculation data for typical distillation operations using high-vacuum equipment are included in 16-page folder. High-vacuum still folder—Arthur F. Smith Co., 311 Alexander St., Rochester 4, New York.

Check 2847 opposite last page.

**Figure mixer requirements**

Data sheet offered by manufacturer shows how to figure mixer requirements for all types of mixing problems. Bul 107 — Mixing Equipment Co., Inc., 185-n Mt. Read Blvd., Rochester 11, N. Y.

Check 2427 opposite last page.

**Electric heating elements**

Bulletin of four pages describes electric heating elements developed originally to meet specific requirements of atomic laboratories. Success in this field suggests other applications in various industrial fields. "Thermoshell" Bul — Cooley Electric Manufacturing Corp., Dept. TS-F6, 50 S. Shelby St., Indianapolis 7, Indiana.

Check 2848 opposite last page.



*"It took a million dollars to perfect it but we think it will eventually pay off."*

# Stainless Steel Fabrication by KIRK & BLUM

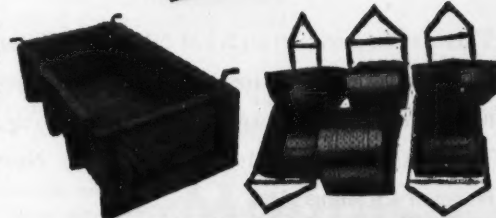
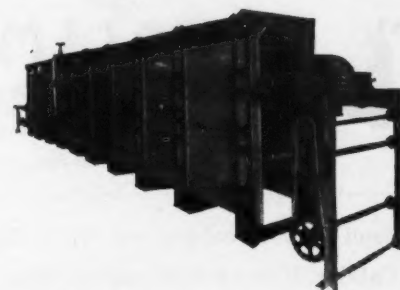
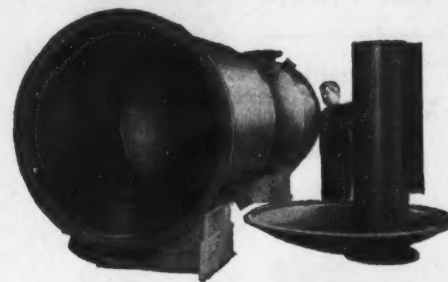
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Utensils

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Check 2850 opposite last page.

Send for your copy of our NEW Filter Cloth Catalog. Here are eight pages of data on all the latest synthetic fabric filter cloths. This is a valuable reference tool for everyone concerned with liquid filtration or dust collection. Test data covers the following fabrics: NYLON, DACRON,†† ORLON,\* VINCEL,† DYNEL, TEFLON,\*\*\* SARAN, COTTON, WOVEN GLASS, POLYMAX,† POLYETHYLENE and TREATED COTTON.

There is also a section on NFM NETONE Filter Paper and our other filter papers. Get your copy now... call, write or wire Mr. Clinton B. Scoble, The National Filter Media Corporation, New Haven 14, Connecticut.

\*TM for duPont Acrylic Fiber  
\*\*\*TM for duPont Tetrafluorethylene Fiber  
†TM—NFM Reg. U.S. Pat. Off.  
††TM for duPont Polyester Fiber

Check 2851 opposite last page.

## NEW LITERATURE

### Discusses pure water

Paper discusses differences between distilled and demineralized water. Essentially, these consist of type of impurities removed. Distillation removes all impurities except those entrained in the steam, whereas demineralizing removes only ionizable impurities. Energy cost for distillation is suggested as a justification for demineralization. Resistance as a measure of purity is also mentioned. Paper entitled "Comparison Between Demineralized Water and Distilled Water" is available from Barnstead Still & Demineralizer Company, 2 Lanesville Terrace, Forest Hills, Boston 31, Mass.

Check 2852 opposite last page.

### Blending gas mixtures

Instrument for quality control of continuously flowing special atmospheres and gas mixtures is described and illustrated in two-page data sheet. Bul CB 8-57-2M — Gow-Mac Instrument Co., 100 Kings Rd., Madison, New Jersey.

Check 2853 opposite last page.

### Lab glassware facts

Economics involved in purchase of both lime and borosilicate glassware for laboratory use are discussed in 16-page booklet. Lime and borosilicate glassware are compared in terms of thermal and chemical properties as well as importance of accuracy in manufacture. "Facts . . ." — Doerr Glass Company, Vine-land, New Jersey.

Check 2854 opposite last page.

### Slurry pumps

Bulletin describes diaphragm slurry pump capable of handling material ranging from pure liquid to slurries containing up to 60% abrasive solids. Bul 5003 — Dorr-Oliver Incorporated, Stamford, Conn.

Check 2761 opposite last page.

## Specify NAYLOR PIPE and PIPE FITTINGS



TO SPEED  
THE JOB  
AND  
CUT COSTS

WATER LINES  
AIR LINES  
GAS LINES  
COMPRESSED  
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Here is a lightweight pipe with extra strength and safety to handle jobs normally requiring heavier-wall pipe. Its exclusive spiral-lock construction acts as a continuous expansion joint—absorbs shock loads, stresses and strains. Sizes range from 4" to 30" in diameter. All types of fittings, fabrications and connections including one-piece Naylor Wedge-lock couplings to speed installation and cut costs. Available in steel, alloys and stainless steel.

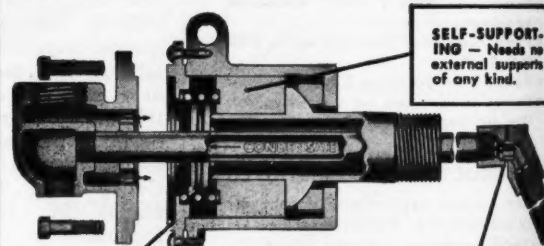
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No. 507 and No. 525

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Naylor Pipe Company  
1260 East 92nd Street  
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Check 2855 opposite last page.



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ING — Needs no  
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ASSEMBLY PLATE  
— Holds internal  
parts in position  
when head is  
removed.

SYPHON ELBOW  
— Permits use of  
straight pipe for  
siphon. Can be  
inserted or with-  
drawn right  
through the joint.

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with **SYPHON ELBOW**

Johnson Joints represent the best way industry has yet found to get steam or liquids into rotating rolls and cylinders. They are completely packless, need no lubrication or adjustment. The Type SBP shown gets steam in, condensate out, through the same head. Other types available for through flow service, in sizes to meet all operating needs.

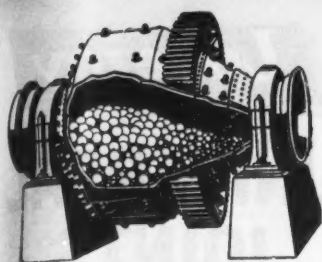
WRITE FOR COMPLETE INFORMATION.

The Johnson Corporation

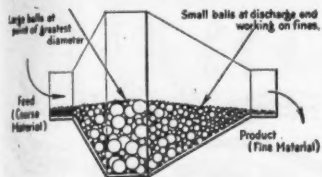
826 Wood St., Three Rivers, Mich.

Check 2856 opposite last page.

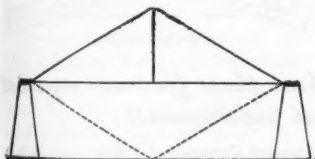
CHEMICAL PROCESSING



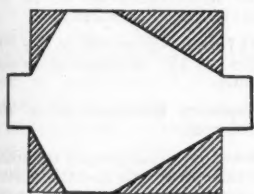
## HARDINGE CONICAL GRINDING MILLS



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Truss-like structure . . .



No dead corners . . .

The principle of the Conical Mill is sound. Note that the longitudinal cross section forms a truss. Strength is obtained without massive construction. Excessive dead weight, extra power and high operation costs are eliminated.

Bulletin 17-C-13, dry grinding; Bulletin AH-389-13, wet grinding.

**HARDINGE**  
COMPANY, INCORPORATED

PHILADELPHIA 348 Arch St. Main Office and Works  
New York - Chicago - Milwaukee - Houston - Salt Lake City - San Francisco

Check 2857 opposite last page.

DECEMBER 1957

## NEW LITERATURE

### Speedy flow control

Bulletin shows how differential-pressure transmitters have proved advantageous to various industrial processes through their high-speed flow measurement and control. Bul 13-11A — The Foxboro Company, 8112 Norfolk St., Foxboro, Massachusetts.

Check 2572 opposite last page.

### Dechema annual report

Forty page report, published in German, describes 1956 activities of the German chemical society, Dechema. Report contains accounts of numerous lectures and gives information on research and development conducted in various branches of chemistry and chemical engineering. Annual Report 1956 — Dechema, Frankfurt am Main 7, Postfach, Germany.

### Improved encoder data

Manufacturer's data sheet shows improvements made in standard 13-digit and 16-digit analog-to-digital shaft angle encoders. Bul 0457 — The Baldwin Piano Company, 1801 Gilbert Ave., Cincinnati 2, Ohio.

Check 2858 opposite last page.



"What's he yelling about  
—We've given him an  
ivory tower!"



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● The Morris Pump operating right now will continue to function efficiently for many years to come. Long periods of testing have proved that.

Every pump built by Morris Machine Works is extremely rugged, dependable, trouble-free; operates with minimum attention . . . cuts maintenance costs . . . can be quickly dismantled for inspection, avoiding lengthy and expensive lay-up time.

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Check 2859 opposite last page.



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Main Products \_\_\_\_\_

## NEW LITERATURE

### Liquid processing data

Manufacturer of liquid filtering, mixing, pumping, and storage equipment offers advice on liquid processing problems and complete descriptions of equipment. Analysis forms and literature available from Alsop Engineering Corp., 1210 Alsop Square, Milldale, Connecticut.

Check 2645 opposite last page.

### Film badge services

Folder describes various types of radiation protection badges, beta-gamma, X-ray, and neutron, and services offered by manufacturer. Bul FB — Technical Publications Dept., Tracerlab, Inc., 1601 Trapelo Rd., Waltham 54, Mass.

Check 2861 opposite last page.

### Tough pumping?

Bulletin which describes diaphragm pump lists reasons why pump should be used for tough pumping applications involving corrosives, abrasives, hazardous materials, etc. Bul 137 — T. Shriver & Company, Inc., 846 Hamilton St., Harrison, New Jersey.

Check 2650 opposite last page.

### Low-lift pallet truck

Complete specifications, along with drawings, of low-lift pallet, walkie-type, electric industrial truck are contained in four-page bulletin. Bul 1008-W — Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill.

Check 2862 opposite last page.

### Metal hose, joints

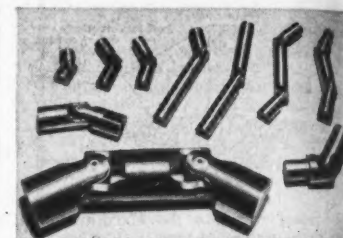
Applications, and specifications of manufacturer's line of flexible metal hose and expansion joints are presented in 8-page cat. Cat 171 — Flexonics Corporation, 1322 S. Third Ave., Maywood, Ill.

Check 2863 opposite last page.

# Lovejoy

## UNIVERSAL JOINTS

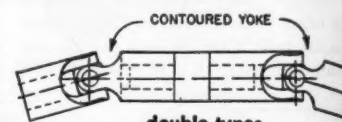
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**Standard Specifications**—hub diameters 1/2 to 4" . . . bores 1/4 to 2" . . . lengths (single) 2 to 10 1/2", (double) 4 to 21 1/2". All specifications can be altered or special joints designed to individual requirements.

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It's the quick and easy way to get the Universal Joint that is just right for your application. Request Bulletin B20.



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Chicago 44, Ill.

Check 2864 opposite last page.

CHEMICAL PROCESSING



## Creativity and Survival

From page 27

bution as a major advance. Public relations practitioners have an apparent compulsion to do this.

It is perhaps fair to say that in the hierarchy of the intelligentsia, only the perceptive individual has the capacity to recognize what is meant by creativity. Most of us wish to think of ourselves as creative, but by this we generally mean that we are clever. True creativity is not cleverness. It is the specific capacity to bring together seemingly dissociated observations into a single concept, from which predictions can be made about events of which nothing is known.

Creativity in the largest sense is abstract. It is not concrete; it is not a matter of building an icebox or a television set or an automobile with more lights on the tail fins. It is not involved in the isolation of a new virus, or in the production of a new vaccine. It does not consist of assembling ingredients to make a new vitamin tonic nor in putting together component parts to make a new automobile.

Creativity is the product of the highest form of intellectual effort. It is an integration of seemingly dissociated and isolated ideas into one all-encompassing generalization. Creativity is reflected, and brilliantly so, in the work of Einstein, the creation of the special and general field theories of relativity. Creativity was manifest in the mass energy equation, though not particularly in the resultant development of an atom bomb and a hydrogen bomb. Creativity was shown by Gibbs when he created the laws of thermodynamics. It was manifested by Eisenberg when he enunciated the principles of indeterminability.

Technological development in its entirety is a natural and largely routine evolution from the conceptual roots of true creativity. What is often termed creativity is this kind of development at a very high level. Many — in fact most — Nobel prizes are given not for creative achievement but for a high type of technological achievement.

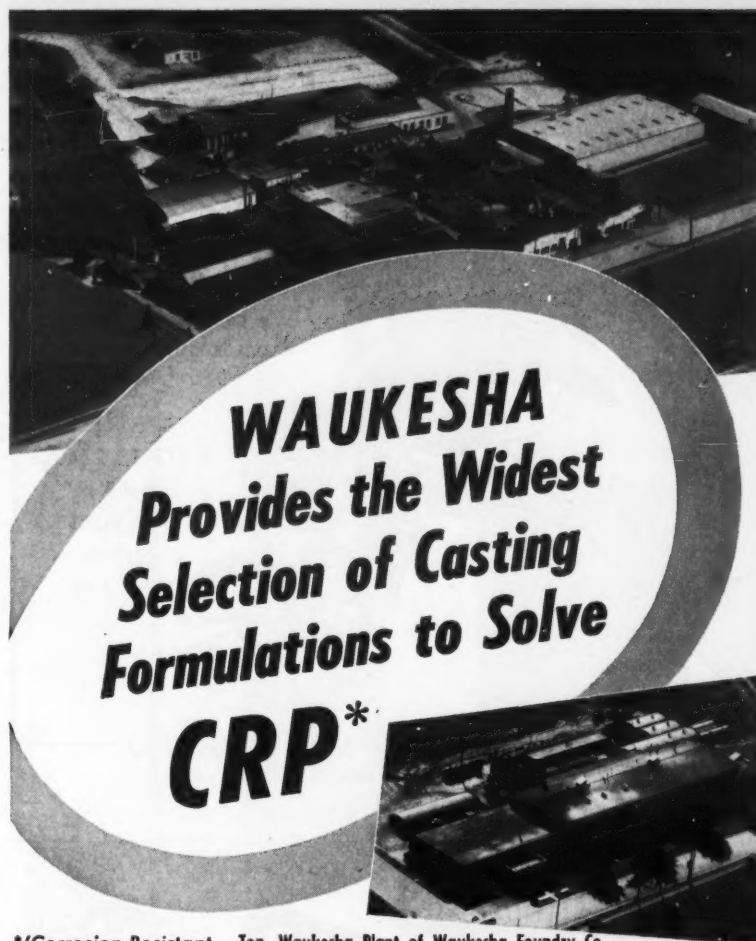
I do not wish to deprecate in any manner the merit of technological development. I am only endeavoring, however inadequately, to urge a realization of the tremendous importance of creativity. The future belongs to science and the nation with the best science will dominate the world scene. This depends on just one thing, and that is creativity.

I had the pleasure of discussing this problem with Professor Einstein shortly before his death. I asked him if anything could be done to improve the situation, and he replied that he did not believe so. He said that he thought a situation might be created in which the possibilities for creative activity would be greater, but he emphasized that individual creativity is a unique unknown quality which cannot be brought into existence by any known mechanism.

The second step toward correction of the unfortunate dearth of creativity in the United States depends on a consideration of environment. The American scene is not properly attuned to creativity. American educators are in general keenly aware of this.

The youth of the nation is constantly exposed to what has become the supreme glamor of athletics. No one can deny the merit of sports when they are given their proper prominence in the total situation. But a national obsession with sport at the expense of the development of the intellect is not a good idea. The youth of today is constantly exposed to the earning power, the fame of the star athlete. He is prone to be impressed.

Materialism in the United States is at an all time high. The significance of the individual in society appears to depend not on his creativity but on his bank balance. Ostentatious cars, two-car garages, three-bathroom houses are the absurd symbols of social acceptability. The entire orientation of our social system is toward material acquisition, and the younger generation is naturally so oriented. Most of us can remem-



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### WAUKESHA is that foundry.

And even if you *know* you have the perfect metallurgical solution, your source for castings should be a foundry with high production facilities — yet so versatile that only *one* casting is welcome — and where through constant metallurgical analyses from ingots to pours — uniformity in all characteristics is absolute.

Again, WAUKESHA is that foundry.

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## WAUKESHA FOUNDRY COMPANY

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WAUKESHA

WISCONSIN

Check 2865 opposite last page.



CATAWISSA VALVE & FITTINGS CO.

CATAWISSA • PENNSYLVANIA

Check 2866 opposite last page.

## CESCO JR. DUMPERS

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**BAGS • BOXES  
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**Loads Bins, Batchers and Mixers**

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**CESCO JR. DUMPERS**

**EASY!  
PORTABLE!  
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**Just Press  
The Button**

## Creativity and Survival

*From preceding page*

ber the time when a wrist watch as a graduation present from college was highly regarded, but today nothing short of a convertible is much esteemed.

A further adverse environmental factor today lies in the cultural passivity of a generation of parents who subsist on television and rarely read a book. I have among my friends, as I am sure you have among yours, people who have not read a book for years. On the other hand, they can give you the precise hour when any program you might name appears. The family eats dinner in front of a television set, thus obviating the need for conversation.

Participation even in normal social intercourse has been replaced by passivity. There can be no question but that this environmental trend is a serious hindrance to creative ability. It may be difficult, if not impossible, to correct this situation, but the problem must be dealt with if American thought is to continue to be productive.

The atomization of knowledge is a third major problem which must be recognized and dealt with by educational

concern themselves with details. So a scientist has a detailed field; he is an enzyme biochemist or a physical biochemist or biochemical physicist, but not an unalloyed biochemist.

All this is deplorable — not in itself, since consideration of details is essential, but because it eliminates any tendency toward synthesis. Because the educational system in which I was subjected was concerned with detail, I studied human anatomy in three separate courses under three separate sets of circumstances. First as an undergraduate, then in graduate school, and finally in medical school I studied the human body from top to toe and from side to side. Of the multitudinous details which were drilled into me, remorselessly I remember a small percentage. When I want detailed anatomical information I look it up in the library. This gives me a sense of justice, since I am quite sure that this is what my anatomy professors did immediately before their lectures.

And I think that my fellow students and I would have been much better trained had the time allotted for the acquisition of soon-forgotten detailed knowledge been spent in synthesizing and correlating a relatively few basic facts.

This I believe leads naturally to the fourth point which I wish to make — that more emphasis must be placed on integrative thinking. The ability to integrate observations and then to generalize is at the same time the hallmark of creativity and that of genius. The study of the stepwise development of the great scientific concepts by these procedures would be of inestimable value in training our students for real achievement.

The concept of knowledge for its own sake should be expanded to include the thought that no fragment of knowledge can be regarded as significant until it has been incorporated into, and assigned its proper place in, the over-all framework of the total, ordered, universe.

With this approach, and this

### You don't agree?

Why not? Perhaps your own experience has proven that there are other important facets to be considered. If so, why not put it in writing, so we can publish your views in the Letters from Readers column (page 12)? Send your comments to:

The Editor

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means. The tremendous growth of knowledge has perhaps fostered this compartmentalization which is nevertheless to be deplored. Today, no one is considered, or considers himself to be, for example, a biochemist, on the basis that the field is so broad that it is impossible for one individual to have at his command all the detailed information available. Our entire academic world concerns itself with details. Our scientific meetings and journals



approach alone, can it become possible to transcend the limitations imposed on us by the imperfections in investigative methodology. It is apparent, for example, that the living cell as we know it far exceeds in its totality the sum of its component parts. Only by the integration of all our knowledge of the cell — its components, its neighbors and its can we hope to understand its fundamental nature.

Implicitly in this is the idea that integration cannot be confined to facts within one scientific or esthetic relationship to the whole — pline. Essentially, chemistry cannot be dissociated from physics, physics from philosophy, philosophy from chemistry. Each problem must be considered beyond the limits of a specific field, and beyond the limits of specific methodology.

New methodologies will be evolved, but they must be used as tools for, rather than limitations on, the human intellect. The Aristotelian contempt for the value of observation has been replaced, in a sense, by a contempt for anything beyond a rigidly circumscribed mass of details. The abstractions of science, and the possibility of extrapolating largely from science, have been overlooked. Like the cell, science should be considered as a part of a



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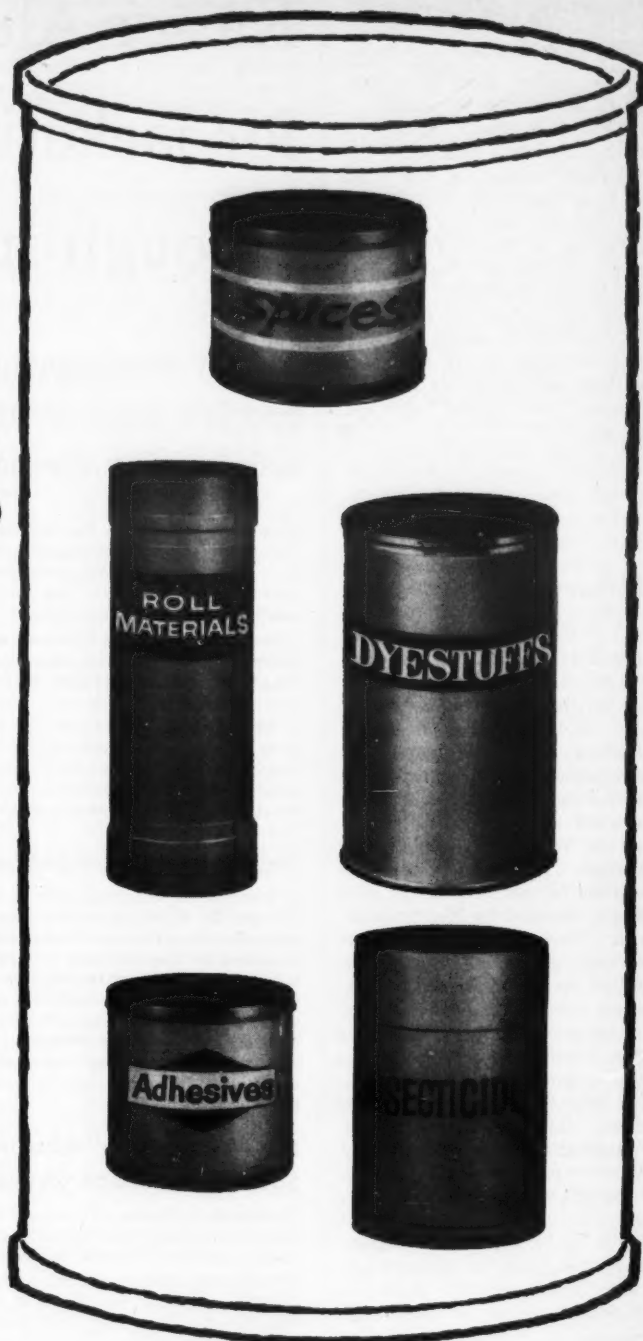


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Check 2868 opposite last page.





## Creativity and Survival

From preceding page

whole, rather than as an infinite assemblage of detail.

This, I believe, although it may represent a change in our standard values, is the road to true creativity. But before we can set our feet, on this road, we in the United States must recognize the significance of creativity and our need for it. Only an appreciation of the necessity for this type of thinking will enable us to hold our place as a world power, and indeed, perhaps, to survive. ■

## Manpower Shortage

From page 29

expectancy in 1975 is estimated to be about 80 years.

On this basis, many groups are recommending 65 as an optional retirement age, not compulsory. These groups — and they are those who have studied and concerned themselves with the problems of retired people — argue against forced retirement if it is not desired by the individual. They point out that forced retirement is a rough thing on people with a lifetime devotion to their work, (younger people may find this hard to believe) and in the scientific and technological field this is more often the case.

Recognizing more and more that forced retirement is an unsatisfying thing to most employees, many companies have come up with, or are adopting, programs to prepare elderly employees for their retirement. Some of these are aimed at creating new interests.

People who have made their work their main interest just can't drop it over-night, except for reasons of ill-health.

At this point, let's take another look at Mr. Guillaudeu's case. His many years in industry, and his active interest in professional societies (including a term as chairman of Chicago's ACS section) have all gone into building up a lifetime of devotion to his profession. His main interests

# Kaiser Aluminum sheet for jacketing offers new economies through improved application methods

Recent developments make possible new low costs for the power, refinery and chemical industries

As you can see in the relative cost charts at the right, aluminum sheet jacketing now offers the *lowest first cost* of four well-known finishing methods for pipe insulation . . . and it offers *lower first cost* than wet-construction finishing methods for vessel insulation.

Another important fact, not revealed in the charts, is that aluminum's first cost is becoming *increasingly* competitive, thanks to newly-developed methods that speed application and reduce labor costs!

And if maintenance costs were added to the comparisons, aluminum would present an *even better value* — because only aluminum eliminates maintenance.\* Its remarkable resistance to corrosion eliminates the need for painting . . . even when exposed to weather and mechanical abuse.

## New Dry Wall Construction for Vessels

A number of improvements in application technique—developed by Kaiser Aluminum engineers in cooperation with specialists from various industries—adapt dry-wall type construction to the finishing of large cylindrical and flat insulated surfaces. These techniques virtually eliminate the need for costly application methods used to apply wet materials such as insulating cements, emulsions, mastics, adhesives, glue sizing and paint. Where corrugated aluminum sheets are used, positioning and fastening are simplified and speeded by familiar techniques employed for block insulation.

## New "Snap-Back" Aluminum Jacketing Speeds Installation on Piping

Aluminum's unique advantages in light weight and superior workability have made possible greatly simplified preformed "snap" jackets for quick, easy application on piping.

Jacketing, preformed into undersize tubes from stiff sheets of aluminum, will snap back to a tight fit when placed over pipe insulation, freeing both hands for fastening. This tight fit requires less fasteners per running foot.

The following is an outline discussion of important factors in aluminum jacketing materials and alloys, with suggested application methods best suited to various insulated surfaces, including pipes, vessels, vessel heads and others.

## The Jacketing Alloys

The following aluminum alloys, supplied in flat or coiled sheets, are successfully used for insulation jacketing: 1100, 3003, 3004, 5005, 5050, 5052, Kaiser Aluminum industrial roofing and siding alloy, and Kaiser Aluminum standard roofing alloy.

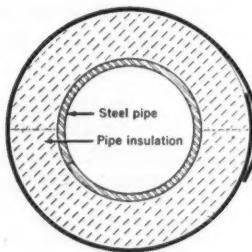
\*Roofing felt has a lower initial cost than aluminum, but painting and maintenance offset this initial cost advantage.

FOR PIPES:	
Method of Finishing	Relative Cost Installed (Material & Labor)
1. Plain aluminum sheets.	██████████
2. Canvas (6 oz.) pasted with lagging adhesive, plastic sealer, 1 coat of paint.	████████████████████
3. Rosin paper, canvas with wheat paste, glue size, 2 coats of paint.	████████████████████
4. Canvas (6 oz.) lagging adhesive, 2 coats of paint.	████████████████████

Results of first cost analyses of various insulation finishes

NOTE: Charts show first costs only. To arrive at total costs, maintenance costs must be added. Whereas other finishing methods require frequent and costly maintenance, aluminum jacketing is virtually maintenance-free.

FOR VESSELS:		
Method of Finishing	Color	Relative Cost Installed (Material & Labor)
Corrugated aluminum banded. (0.024" thick)	Aluminum	██████████
Corrugated aluminum fastened with screws. (0.024" thick)	Aluminum	██████████
A 1/4" coat finishing cement, wire mesh, 1/2" (dry) asphalt emulsion.	Black	██████████ + Painting
A 1/4" coat finishing cement, glass cloth, 2 sprayed coats asphalt cut-back mastic.	Black	██████████ + Painting
Scratch and finish coat insulating cement over wire mesh; 2 coats asphalt emulsion over wire mesh.	Black	██████████ + Painting
Scratch and finish coat insulating cement over wire mesh; vinyl emulsion, adhesive and sealer coat over 8 oz. canvas.	Off-white	██████████ + Painting



Sketch shows how preformed jacketing snaps back over piping, providing quick installation combined with tight fit. This is also demonstrated in photo titled "Team-work."

Based on maximum economy and performance, the general recommendation is the use of Kaiser Aluminum alloy 5005 and Kaiser Aluminum industrial roofing and siding.

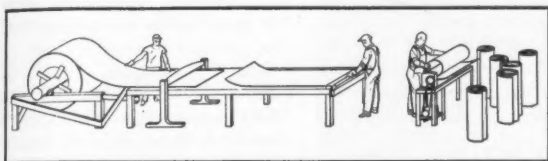
The reasons for this recommendation, and the exceptions to it, are as follows:

(a) Alloys in the 5000 series (which contain magnesium as the principal alloying element) and the clad alloys, such as AlClad 3004 (from which Kaiser Aluminum industrial roofing and siding sheet is made), offer superior corrosion resistance—especially in marine atmospheres.

(b) Alloy 5005 and the industrial roofing and siding alloy provide top performance at lowest cost for most jobs. Alloy 5050 shows an advantage from the standpoint of strength over 5005, and in many instances its slightly increased cost (a fraction of a cent per square foot) is warranted. Where exceptional strength is required, alloy 5052 should be used.

(c) Closely allied with alloy selection is a consideration of the section modulus of jacketing for large diameter vertical vessels. Kaiser Aluminum industrial roofing and siding sheet is superior in section modulus. On certain vertical vessels, usually those in the range of 3' to 12' in diameter, some designers prefer the close-up appearance of smaller corrugations. When this is preferred, most of the common alloys and the standard corrugated roofing alloy are satisfactory. Sheets should be 0.024" thick, embossed, corrugated to 1 1/4" x 3/4", and supplied in finished widths of 26".

A metal thickness of 0.024" is recommended in most cases. Corrugated aluminum 0.024" thick can be banded at less material and labor cost than the thinner 0.019" material fastened with screws. For insulated pipes with an O.D. of 12.75" and less, 0.020" thick aluminum sheet is recommended.



These illustrations show method used to fabricate snap jackets:

1. Using aluminum of proper alloy and temper...
2. Cutting it to proper dimensions for easy, economical installation...
3. Properly stiffening the overlapping edge by a simple angular crimp...
4. Forming it through a roller for proper circumference...
5. Snapping it around insulated pipe (below).



Teamwork—with one man to snap jackets in place and another to band them, two men can cover 700 feet of 10-inch diameter tubing in one day!

The best temper for pipe jacketing is 3/4 hard, designed as H-16 or H-36. For fitting jackets requiring numerous lock seams, 1/2 hard temper, H-14 or H-34, is recommended.

### Pipe Jackets

Snap jackets are a quick, easy and economical method of enclosing insulated pipe. The simple process shown above produces a most effective jacket for pipe insulation. (Kaiser Aluminum's booklet, "Insulation Jacketing Materials and Methods," explains and describes the process in full detail.)

The alloy recommended is 5005-H16, in coiled sheet form with plain finish. Embossed finishes are also available. Other alloys may be used, but it is desirable to use one alloy throughout. Width of coiled sheet should be 36". Recommended thicknesses of sheets are 0.020" for insulation O.D. of 12.75" and under, and 0.024" for insulation O.D. of 14" and larger.

### Vessel Jackets

Insulated vessels 36" O.D. and less—horizontal or vertical—should be jacketed with 0.024" thick by 36" wide 5005-H16 alloy sheet, plain finish preferred.

For insulated vessels larger than 36" O.D., horizontal mounting, use the same coiled sheet as above; for vertical mounting, use Kaiser Aluminum industrial roofing and siding, 0.024" thick, embossed finished, 7/8" deep corrugations with 2.67" pitch.

### Jackets for Large, Flat Surfaces

For breechings and ducts, indoors and out, Kaiser Aluminum industrial roofing and siding, 0.024" and 0.032" thick and having 7/8" deep by 2.67" pitch corrugations are most economical. Flat sheet, fluted sheet, and flat sheets stiffened with roll-formed standing seams offer other possibilities.

For insulated boiler walls, jackets may be made of aluminum sheets of several types. Thickness, size and fastening method will vary with specific boiler designs.

### Fasteners

For pipes and vessels with insulation O.D. 36" or smaller, bands may be slit from the same aluminum sheet used for pipe jackets, or they may be purchased as standard stock items. For pipe insulation O.D. 12.75" and smaller, bands should be 1/2" wide by 0.020" thick, equal to A. J. Gerrard #305-AL; seals should be equal to A. J. Gerrard #202-AL. For pipe or vessels with insulation O.D. 14" to 36", bands should be 3/4" wide by 0.020" thick, equal to A. J. Gerrard #311-AL; seals should be equal to A. J. Gerrard #204-AL. For vessels with insulation O.D. 36" and larger, 3/4" wide by 0.020" thick #18-8 stainless steel expansion bands should be used. Banding should be equal to A. J. Gerrard Expand-R-Strap, #E311 1/2 S-4; seals should be #18-8 stainless steel, equal to A. J. Gerrard #204-SS.

When required for pipe and fitting jackets, #7 by 1/2" aluminum pan head self-tapping screws, Type A, are suggested. Side laps and flashing with corrugated vessel jackets should be fastened with #7 x 3/4" aluminum pan head screws, Type A. Aluminum screws should be made from either 6061-T6 alloy or anodized 2024. For fastening aluminum jackets to steel structural members, use #14 hex head screws, Type B, made from stainless steel #18-8 alloy; #410 is acceptable.

Composite studs made from #18-8 stainless steel and aluminum (equal to Nelson Rivweld Studs or to Nelson Set Lock Studs supplied with aluminum washers) may be used to fasten corrugated aluminum jackets to angles. On siding, fasten studs on low part of corrugation. On roofing, fasten studs on crown of corrugation.

### Aluminum Jacketing Booklet Available

Kaiser Aluminum's new booklet, "Insulation Jacketing Materials and Methods," gives you complete details on the subjects outlined above. It also presents illustrated step by step application methods plus material and accessories charts to help you take advantage of recent advances in aluminum sheet jacketing. Forty fully illustrated pages! To get your free copy, write to: Kaiser Aluminum & Chemical Sales, Inc., Process Industries Department A, 919 N. Michigan Ave., Chicago 11, Illinois.



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have been his work and the professional societies. It would be difficult to make a complete change.

And — by not giving it up, he is getting a new joy out of life. He is doing the thing he enjoys most without enduring the strains and pressures of a regular job. Demand for his services has been such that he could devote more time than is available, but he prefers to keep it down by working four days a week. Very rarely will he work five. He is actually able to enjoy his job as a life hobby.

And, in commenting on his working past retirement, Mr. Guillaudeu offers: "There is opportunity for much happiness. The 'retired' who establishes new and pleasant business connections can enjoy the associations with new friends and with new interesting problems. He can have the personal satisfaction of knowing that he is contributing in worthwhile fashion to the needs of the day.

"Probably he will be able to arrange his work so that he has more leisure than before. He need not be under so great a strain as before. He has more time to give to hobbies and to the family. Meantime, he is usefully and satisfyingly employed."

Therefore, isn't it possible that the companies having manpower shortages could turn an eye toward utilizing those who want to work past sixty-five? If companies are to gain by hiring people like Mr. Guillaudeu to fill certain jobs, maybe they should review their own retirement policies and find among their present staffs, men to meet their needs.

### 1958 Business — Up or Down?

Next month, top men in the chemical processing industries tell how 1958 will shape up business-wise and technologically. This "The Leaders Speak" series, an annual January feature in CHEMICAL PROCESSING, will include comments from key men in the chemical, petroleum, petrochemical, rubber, paint, and allied industries.

Check 2869 opposite last page.



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## Cooperative Research

From page 31

a cooperative research project for a group of four railroads — the New York Central, Pennsylvania, Santa Fe, and Union Pacific. The railroads have organized a joint Freight Equipment Research Committee which is sponsoring a program to improve the design of lading-restraining equipment in all-purpose freight cars — a development which would be of benefit to all four lines.

### Handling Research Projects

Here is how cooperative research projects are handled at independent research institutes, using ARF as an example: Every project begins with discussions between representatives of the prospective sponsor and the Foundation. This is done to obtain a clear picture of the problem and to see if the Foundation is in a position to serve the company or association.

If the problem is one on which the research institute can be of assistance, the proposed program is reviewed by a top-echelon clearance committee to determine whether the work conflicts with other projects, and whether qualified scientific personnel are available for the solution of the problem. At this time each department has an opportunity to consider the problem and to offer its best talent to the solution.

After clearance is granted, the formal proposal is prepared and submitted to the prospective sponsor. This proposal includes a clear-cut statement of the problem, a suggested method of attack, the type of personnel and equipment available for the work, time and cost estimates, and possible impact of the research on the sponsor's activities.

If this proposal proves acceptable, a simple research contract is prepared and submitted to the company or organization for approval. When approval is granted, the research is begun in accordance with the terms of the approved proposal and contract.

Periodic reports are issued and steering-committee meet-

ings are held as frequently as possible to keep the sponsor fully informed on the progress of the work. Changes in the scope of the work are made only with the approval of the sponsor.

The work on the sponsor's problem is fully summarized in a final report and often results in the development of prototype models of new or improved products, pilot plants, and even operational units.

In the entire procedure the sponsor and the research institute work hand-in-hand to assure that the approach taken is consistent with the needs and desires of the sponsor. Indeed, the effort is a joint one, the research personnel serving practically as members of the sponsor's organization.

Many examples could be cited of medium-sized and small companies which have benefited through such a procedure. Even companies having some of the nation's most extensive research facilities — General Motors, Westinghouse, Du Pont, US Steel, etc. — also are among the frequent users of contract research. No matter how large the company, it cannot justify the cost of staffing and equipping to handle every research problem, especially in fringe areas.

More and more companies are "farming out" research and development, if the growth of independent industrial research organizations is any indication. In 1936, only two independent, not-for-profit research institutes were in existence, and they performed a combined research volume of about \$1 million. Today, there are some 50 such organizations, having a total annual volume in excess of \$100 million.

It has been estimated that

### What do you think?

Do you agree with the opinions stated in this article? Or do your views differ? You can say what you think in the Letters from Readers column on page 12. Send your comments to:

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## Heavy Rare Earths

From page 41

solid state reaction at elevated temperature as high as 1400 degrees centigrade. Variations in magnetic and dielectric properties can be obtained when different types and amounts of rare earths are compounded into the ferrites. The rare earth ferrites are referred to as garnets because their crystal configuration is that of the mineral garnet. Their magnetic properties can be explained in the basis of this configuration utilizing Neel's theory of ferrimagnetism. These materials with Curie points around 300°C possess much narrower ferrimagnetic resonance line widths than the common type of ferrite with the spinel structure, and the usefulness of a ferrite at microwave frequencies is associated with its ferrimagnetic resonance. This makes the rare earth ferrite extremely valuable at certain microwave frequencies and is expected to permit the realization of electronic devices which heretofore were unattainable.

Other applications in the electronic field for "heavy" rare earths lie in their potential use as activators for phosphors used in color television picture tubes. Samarium and gadolinium salts particularly have been investigated as activators. Samarium compounds will act as sensitizers for phosphors excited in the infrared region.

Gadolinium ethyl sulfate may have application in a



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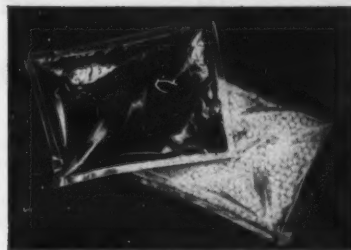
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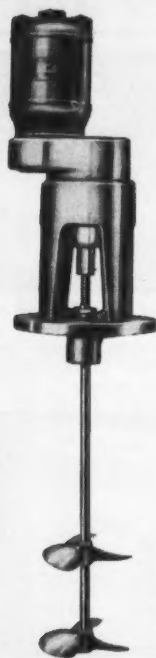
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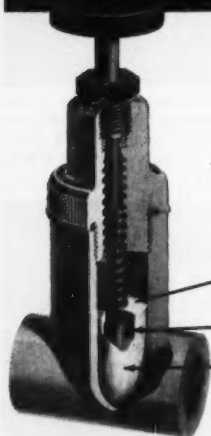
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## NEW! ALL-PLASTIC GATE VALVE



### VANTON FLEX-PLUG\* VALVE

1/2" - 2" sizes

- No-pressure-drop construction of gate valve
- Throttling flow-control feature of globe valve
- PVC or styrene-copolymer construction
- Handles wide range of corrosives and slurries

■ Back-seating feature of cap: when valve completely open, relieves pressure on packing.

■ Free-to-swivel plug: provides even wear of cap, perfect closure.

■ Flexible synthetic cap: easily replaced without removal of valve from line; minimal maintenance. Handles abrasive slurries without wear.

■ All-plastic design — PVC or styrene-copolymer: Replaceable caps available in Neoprene, Buna-N, and Hypalon (Kel-F elastomer on special order).

■ Suitable for vacuum — resilient cap makes excellent seal.

■ Adaptable to all existing plastic pipe and fittings; especially suited to Vanton P, S, and N lines of plastic pipe and fittings.

■ Rated for 150-lb. service — PVC line up to 140°F., styrene-copolymer line to 170°F.

\*Pat. Pending

Catalog FP-1  
gives full details.  
Write for it today!



**VANTON PUMP**  
and Equipment Corp. • Hillside, N. J.  
DIVISION OF COOPER ALLOY CORP.

Check 2873 opposite last page.

## Heavy Rare Earths

From preceding page

maser, a solid-state device for amplification of microwaves. Its low noise characteristics are of interest in high frequency amplifiers for new long-distance communication systems.


In many applications, use of gadolinium for its magnetic and conductive properties will require extremely low-temperature conditions. Gadolinium and other rare earths, such as dysprosium and erbium, which have unusual superconductive properties, may find applications in the new field of cryotrons.

In the periodic table, rare earths are classified as "transition elements". They have changing valency and paramagnetic properties. In general the elemental "heavy" rare earths are strongly paramagnetic, a property which is associated to their electronic structures. Some of these elements such as dysprosium, erbium and gadolinium metals are also ferromagnetic at very low temperatures, having Curie points of 105, 20 to 35, and 289°K, respectively. Based on these ferromagnetic properties, dysprosium and erbium metals may also find certain electronic uses.

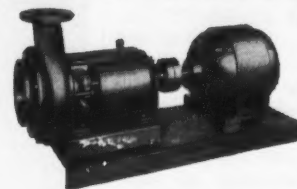
## Ceramics and Refractories

In the field of ceramics and refractories, rare earths will become increasingly more important. Rare earth ceramic materials such as sintered or fused oxides, cermets and refractory material such as borides, sulfides, and carbides, may find uses in components of high-speed aircraft and guided missiles where high operating temperatures and severe thermal shock conditions are encountered. Yttrium oxide, with a melting point of 4370°F, is an interesting refractory which will gain applications as availability and lower costs become favorable.

Also, as costs are lowered, many rare earths may be considered as ceramic coloring agents. In this regard the rare earth oxides hold many attractions for ceramists to consider. Most rare earths have sharp absorption bands in the ultraviolet, visible and near

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## Ingersoll-Rand

10-582

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Check 2874 opposite last page.

## What's A "New Solution"?

It's an article in **CHEMICAL PROCESSING** describing a new way of solving a tough plant operating problem. In each issue you will find specific "case histories" showing how these processing problems were solved.

Each article states the operating problem... explains the process used and gives details of how problem was solved... shows results secured.

Take a look at "New Solutions" articles in this issue — they might suggest a "solution" for some of your tough processing problems.



## Threaded Specialties

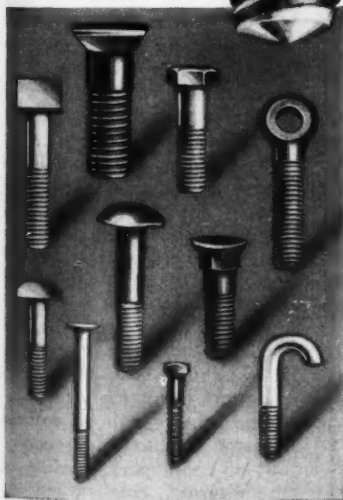
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Check 2875 opposite last page.

DECEMBER 1957

infrared regions. This property is associated with the electronic structure and imparts beautiful pastel colors. Erbium oxide, for instance, gives a pink color. Physical properties of the "heavy" rare earths of interest to the ceramists are given in Table III.

Recently, boron chemicals have elicited considerable interest. Hexaborides of the rare earths have been identified and more recently tetraborides of samarium, gadolinium, ytterbium, and yttrium. Hexaborides usually occur with the tetraborides. The refractory and hardness properties of these borides are under current study.

### Catalysts

Certain rare earths appear to be promising catalysts. For example, samarium, gadolinium, dysprosium, and yttrium oxides have been recently studied in dehydration and dehydrogenation of ethyl alcohol. Of these, samarium oxide exhibited both dehydration and dehydrogenation activity, dehydration being the greater. Investigators have reported that activity is substantially improved when samarium oxide is deposited on alumina.

Samarium oxide also holds possibility as a selective catalyst for dehydrogenation of paraffins in natural hydrocarbon mixtures. n-Heptane and 1-octene can be cyclized and dehydrogenated at 525°C. In addition, samarium oxide can dehydrogenate cyclohexane to benzene under certain conditions. Gadolinium oxide is also reported to effect ortho-para hydrogen conversion, as does samarium oxide.

Many pure, rare metals, such as palladium, rhodium, ruthenium, and platinum, have proved of value as special catalysts. There is no reason to believe that diligent catalyst research on rare earth metals will not also prove fruitful. To date, poor availability and high cost have been deterring factors in their investigation. However, as some of these "heavy" rare earth metals are now becoming available at reasonable cost, catalyst research should itself be catalyzed.

There are other numerous applications for "heavy" rare

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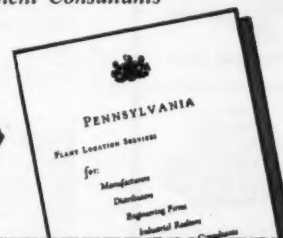
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Check 2876 opposite last page.

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Check 2877 opposite last page.





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Check 2878 opposite last page.

## Heavy Rare Earths

From preceding page

earths — special glasses, chemical uses, dielectrics, and industrial and medical radiation. However, any wide-scale volume use of these elements will depend to a great extent on (1) producers' ability to reduce manufacturing costs to a point where these rare earth products will become economically attractive to investigate, and (2) on application research, which is proceeding now at an ever-increasing pace.

### Economic Considerations

Considering the first requirement, many of the "heavy" rare earths are now available in larger quantities, in pounds rather than grams.

This also permits relatively reasonable prices. Prices between \$100 and \$300 a pound can be expected on many of these "heavy" rare earths in their oxide form, depending on purity, volume, and individual element.

Availability is on a commercial basis in the case of certain of these oxides, and reasonable prices can be obtained on 100-pound to 1000-pound lots.

Rare earth metals will also become available at much lower costs. Rare earth metal prices under \$300 a pound in large poundage quantities are anticipated in the near future.

As the economic barriers are lowered, rare earth oxides and metals will become increasingly important in our future way of living.

## Short Work Week

From page 44

leisurely three-day period away from work every other week. This system, or variations of it, will receive the extra hour in the evening.

Chemical workers are not so optimistic as to expect a sudden change from five eight-hour days down to four. What they do consider practical is an averaging system; for example, five eight-hour days one week and four eight-hour days the alternate week, giving an average 36-hour week.

### Your views?

How do you feel about the shorter work week? Do you agree or disagree with Mr. Knight? Send us your comments. The most pertinent will be published in "Letters from Readers", page 12 in this issue.

Address your letters: John C. Vaaler, Editor, CHEMICAL PROCESSING, 111 E. Delaware Place, Chicago 11, Ill.

This is precisely the system which was standard in the oil industry prior to World War II. It does not interfere with the practical three-shift operation in a continuous-flow plant; it is relatively easy to

schedule; it gives a man a strongest support from workers in continuous-flow plants and probably from those in unit production plants.

### Lesser Reductions

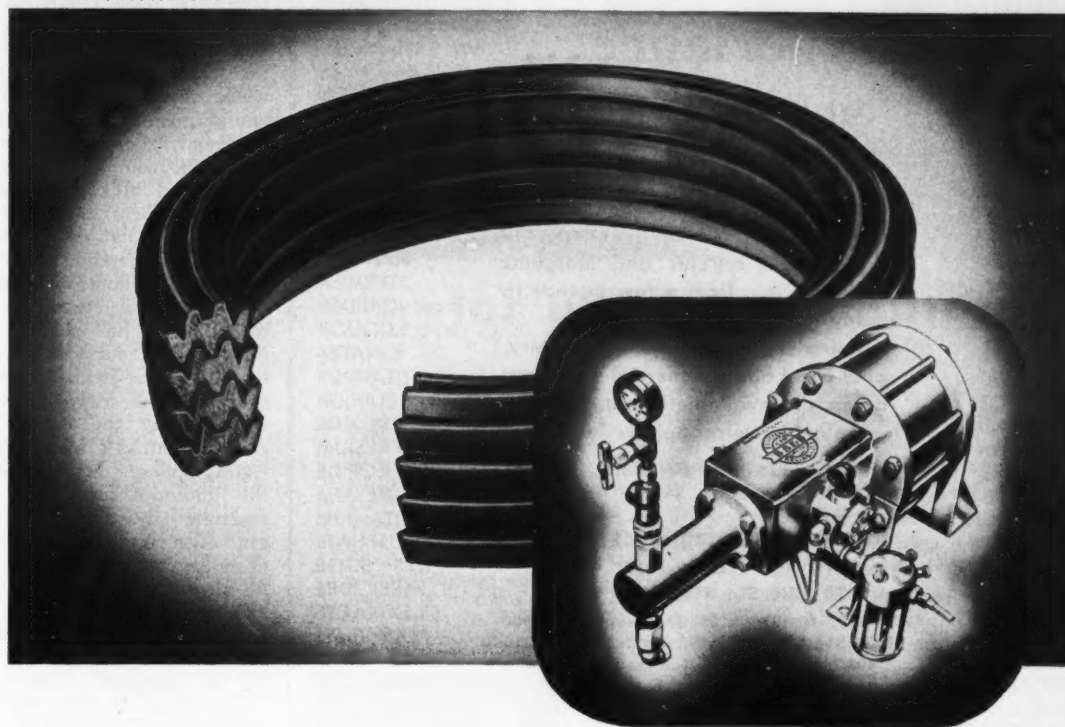
Meanwhile, there will be a receptive attitude toward lesser reductions, such as an extra day off every month, or a fixed number of days per year personal leave with pay, or longer vacations.

Sociologists are beginning to worry about what the working people are going to do with their added leisure time. My only comment is that the use of leisure will vary as individual interests vary. It is easy for the cynical to say that the idle workers will waste their time. It is equally easy to take the sanguine view that the new-found leisure will be entirely devoted to healthful exercise out-of-doors and reading of the literary classics indoors. My own estimate is that most such new leisure will be spent in worthwhile pursuits.

### Second Jobs

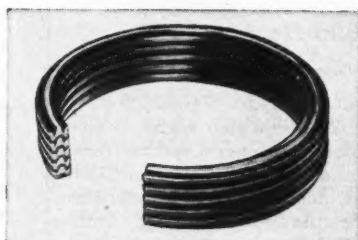
There will be some "moonlighting," or working of second jobs by people not exhausted by their short-shift basic jobs. There are a few greedy people who will follow this practice

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against wide variety of fluids  
and pressures up to 5,500 psi"**

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makers of BS&B Glycol Pump**



**Uneepac comes in two types.**  
Shown here is design for flange  
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BS&B Glycol Pump. Large illus-  
tration above shows design for  
flange widths over  $\frac{1}{2}$ ".

Chalk up another success story for Uneepac—Johns-Manville's automatic ring packing. In the BS&B Glycol Pump, fluids handled include triethylene glycol, diethylene glycol, gasoline, and various types of oils, alcohols and petroleum treating chemicals. Working pressures range from 125 psi to 5,500 psi with average operating pressures at 3,000 psi. Yet despite these rugged service conditions, Uneepac has delivered—in Black, Sivals and Bryson's own words—"very satisfactory service."

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free service. Each ring is a complete packing unit. Fewer rings are needed than ordinarily required and stuffing box size can be reduced to the minimum. Each ring centers itself automatically on the preceding ring to simplify installation. This exclusive design also permits fluid pressure to act upon each lip individually and protects lips from excessive gland pressure.

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**Johns-Manville PACKINGS, GASKETS and TEXTILES**



Check 2879 opposite last page.

no matter how prosperous they may be. Most workers, however, do not want to fill a second job and will not do so if the wages on their basic jobs provide a decent standard of living. There will be considerably more "do-it-yourself" remodeling and repairing of homes. This may distress my colleagues in the building trades, but already they have pretty well marked off home repair and redecoration as a source of employment. Even with the present work week, do-it-yourself is a prevalent practice among industrial workers — extending even so far in some cases as building complete homes during vacations and off-days.

There will be more of an exodus of industrial workers from the cities to rural and semi-rural areas — an already strong trend — where a few acres can be farmed.

And there will be education and recreational advances of the self-improvement nature. Modern industrial workers are literate and imaginative. Believe it or not, many will indeed read the classics, listen to good music, and take correspondence or night-school courses. In even larger numbers they will assume leading roles in civic organizations and churches, serve as Scoutmasters, and play baseball with the youngsters on the sandlots.

## Few Selfish Motives

When our union newspaper took its informal straw vote on shorter working hours, a large number of union members attached letters of comment to their ballots. Few of these letters took a purely selfish view toward the shortening of hours. Nearly all of them, in one way or another, took the view that work should be shared to avoid unemployment. These letters consistently revealed a distinct social consciousness.

I mention this not just to exalt the working people I am honored to represent, but to point out a key factor in the matter of shorter hours. Real pressure from working people to shorten hours will come when economic and social conditions call for shorter hours. To the wage-earning man, the greatest evil on earth



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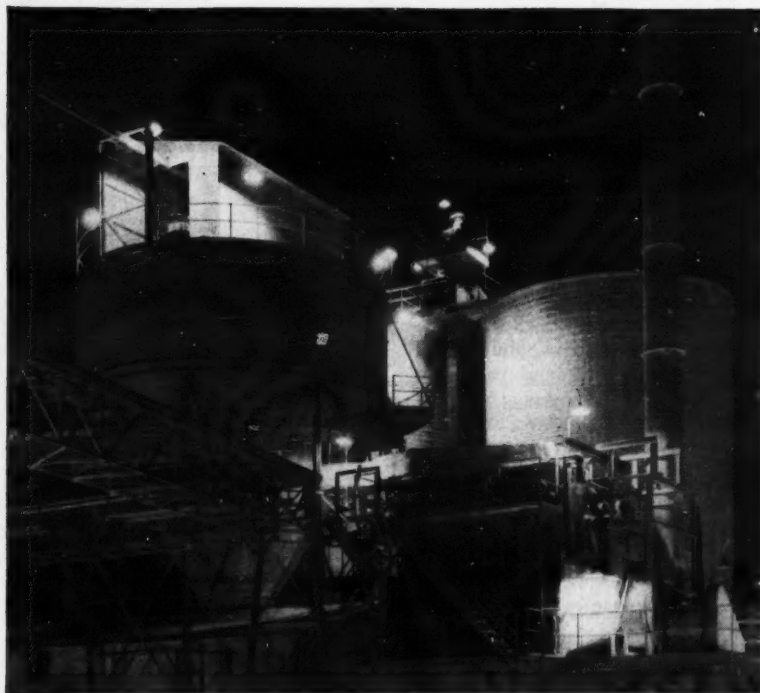
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Check 2880 opposite last page.

## Short Work Week

From preceding page

is unemployment. He will fight it. Erratically and haltingly perhaps, but inevitably he will move in that direction which assures at least a modicum of prosperity for all. This fact is more important, in assessing the prospects for a shorter week, than all of the charts and graphs on production, employment, labor supply, etc., in all of the company personnel offices and all of the union research offices combined.

We trust that deep unemployment demanding a violent, sudden adjustment of working hours will not come. Statesmanship on the part of industry and labor can prevent it. During the next few years there will be early, tentative demands by the unions for shorter hours. If management rigidly opposes these demands, the buildup toward a far-reaching adjustment will begin. If a gradual shortening of hours takes place we will go through an evolution so gradual as to be scarcely discernable and the work week will shorten through a number of fractional reductions.

One thing is sure: Modern technology is proving that in many cases a man today can do the work in an hour that he once did in forty hours. Adjustments to this circumstance — adjustments bringing the greatest prosperity to the greatest number of people — will have to be made. ■

## Solar Heat

From page 97

underground. From here, cooled or heated water is circulated through a radiant floor and ceiling panel system. Both the floor and ceiling surfaces are used for heating. Only the ceiling is used for cooling. Outdoor air for ventilation is supplied through a central air system, with the air tempered in winter and cooled in summer.

A 7½-ton refrigeration unit is provided to aid heating in the winter and cooling in the summer. An evaporative water cooler is used for cooling of the storage water in the



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**WORTHINGTON**



Check 2881 opposite last page.

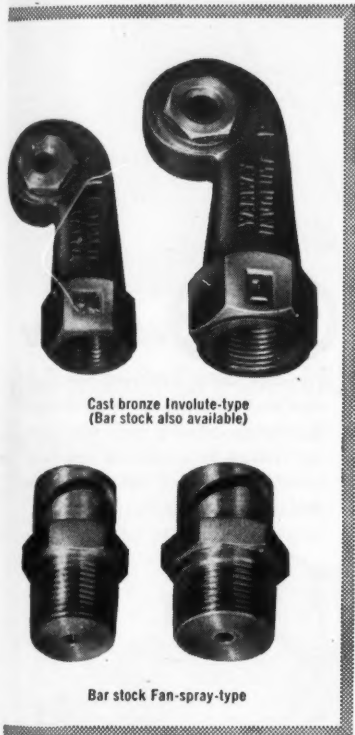
CHEMICAL PROCESSING



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For spraying, washing, rinsing and cooling, Yarway Spray Nozzles will improve the efficiency of your spray equipment.

There are no internal vanes or other restrictions to clog or hinder the flow.



Cast bronze involute-type  
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Yarway Spray Nozzles are available in two types—the Yarway Involute producing fine hollow cone spray with minimum energy loss, and the Yarway Fan-spray for flat fan-shaped spray with time-saving slicing action for cleaning.

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Bulletin N-618.

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**YARWAY** spray  
nozzles

Check 2882 opposite last page.

DECEMBER 1957

summer months. It also serves as a cooling tower for the heat pump when operating on the summer cooling cycle.

The system performed satisfactorily through the worst part of the winter, including two weeks of unusually cloudy weather in January. Technical problems encountered included corrosion of metal parts, freezing of water in the exposed area of the unit during the night, and difficulties caused by air bubbles in the circulating system. Generally, the system worked well down to a storage tank temperature of 44°F, and with a temperature of 40°F leaving the heat pump evaporator coil and entering the collector. There was actually some collection of solar heat during one morning of rare but heavy fog.

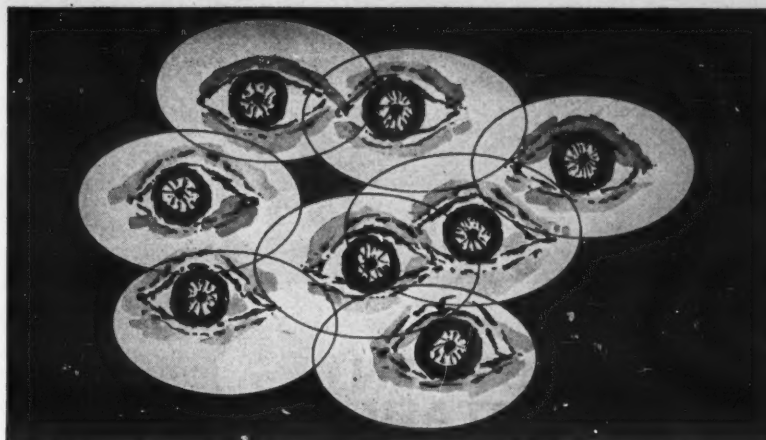
Experience to date indicates that the system tends to be self-limiting. Solar collection efficiency increases rapidly as the collection temperature falls. At high collection temperatures there appears to be a limit of collectability, at least in cold or cool weather. A maximum collection temperature of 110°F was reached in November 1956. Whenever the storage water temperatures are above approximately 85°F, it has been found possible to heat directly without using the heat pump system.

### World's Largest Installation

The mass production of residential heat pump systems presents problems somewhat different from those encountered in very large commercial installations. Commercial and industrial installations warrant the use of a high degree of engineering effort and skill which would not be permitted in the mass production of standardized units. If water is to be used as a heat source, a detailed study of the surrounding geology is necessary.

The unique combinations of heating demand, air conditioning demand, and energy sources usually must be considered in detail.

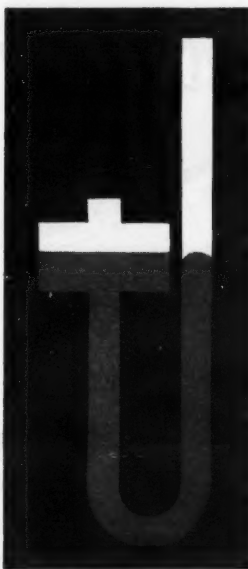
Such an installation is found in the Southdale Shopping Center system located outside Minneapolis, in Edina, Minn. It is the world's largest heat pump installation and



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### Raised-Well Type Manometers

Raised-well type manometers permit zero to be located at any specified point on the scale; with pressure readings upscale, vacuum readings downscale; or in terms absolute. More details in Bulletin G-14.



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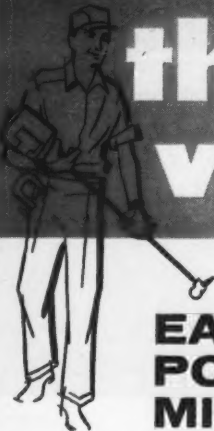
... complete and informative guide to manometer theory and practice as well as manometer models for plant, field and laboratory use. Just ask for Bulletin G-14—The Meriam Instrument Company, 10920 Madison Avenue, Cleveland 2, Ohio.



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Check 2884 opposite last page.

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PURIFIERS • SCRUBBERS • SEPARATORS • MIST EXTRACTORS

Check 2885 opposite last page.

## Solar Heat

From preceding page

provides year-around space conditioning to the largest shopping center located under one roof.

Sixty-seven retail stores occupy an internal area of 675,000 sq ft.

Initial design investigations indicated that the cost of a standard heating system would be approximately \$1,800,000. Over a half-million dollars was saved in initial cost by the use of a heat pump system. Five 16-cylinder reciprocating Freon-12 compressors, driven at 1800 rpm by natural gas engines through step-up gear boxes, were utilized. The relative inefficiencies of the gas engines over electric motors provide additional waste heat which is conserved by jacketing the gas engines with mufflers.

One hundred percent ventilation air is used and cooled in the summer by well water pumped through coils of the fan coil units. In the winter months the ventilation air is heated by hot water supplied to the same coils.

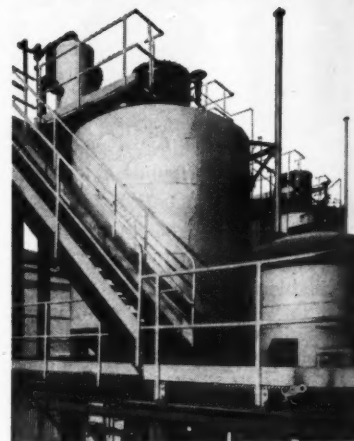
Winter operation requires heat for tempering the outside air introduced to the garden court, which is a twentieth of a mile long and three stories high, and for offsetting the transmission losses through the exterior surfaces of the building structure. Heat for these purposes is supplied through the refrigeration compressors operating as heat pumps. This is supplemented by heat absorbed by the water-jacketed exhaust gas mufflers and gas engines.

The system of water supply and rejection is unique. The major source of water supply, the Jordan sandstone, lies approximately 420 ft under the shopping center. A glacial drift filled with sand and gravel provides an underground storage basin approximately 130 ft below the center. Three deep wells were drilled into the Jordan sandstone and one into the glacial drift. Two of the wells into the Jordan provide pumping wells, and the third is used for returning the water to this stratum. A fourth well permits the storage of hot water



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CHEMICAL PROCESSING



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dry chemicals



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in the glacial drift during the summer months, and the use of this same water during the winter.

The water is taken from the Jordan sandstone at approximately 50°F and is first used for precooling air during the summer. With a 10°F rise, this water then passes to the central conditioning system where the water temperature is increased to approximately 75°F. The water is then circulated through the packaged water-cooled compressors in the tenant buildings and is discharged at approximately 90°F. From here it passes to the engine and muffler jackets, to be discharged at approximately 110°F through a diffusion well into the glacial drift.

In the day hours during the winter months the majority of the heating load of the building is supplied through lighting, and heat from people in the building. The remainder of the heating requirements are provided through the heat pump system with supply water taken from the glacial drift. Initially, last fall, this water was at a 75°F temperature, but since the system had not been in operation a sufficiently long period of time this gradually reduced to 50°F.

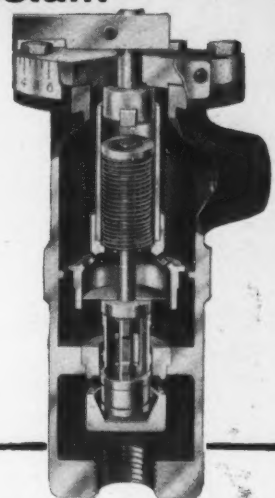
### Future Developments

Several technological breakthroughs in the adaptation of solar energy to space conditioning now appear on the horizon. At least one plastic film has been developed which may eventually be cheaper to incorporate than glass and which possesses approximately the same solar transmissivity characteristics. Simplified fabrication methods of incorporating plates with tubing in the construction of collector plates have been developed. Of even greater importance is the development of surface treatments for both copper and aluminum which provide selective emissivities, high for the absorption of solar energy and low for the reradiation of energy from the collector plate. Such developments bring much closer the era of low-cost solar energy collection for all purposes, including space conditioning.

## Need Adjustable-Constant Flow Rates?

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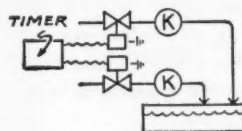


\* KATES Direct-Acting Flow Rate Regulators are complete in themselves, requiring no outside connections except inlet-outlet piping; for light slurries, clear liquids, and many suspensions; hold constant flow despite 125-psi jumps or drops in inlet-to-outlet pressure.

Economy may not be your principal reason for selecting a Kates regulator, but added to the single-unit compactness and no-hunt, no-lag features it is certainly a valued extra. And you will save on maintenance, too. Kates regulators are designed to eliminate wire-drawing, and the only packing is on the infrequently-used dial stem.

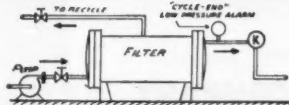
Write us for more details on the unique operating principles and practical design features of Kates flow rate regulators. But first, here are some of the problems that Kates has solved for others—economically.

### BATCH PROCESS MEASUREMENT



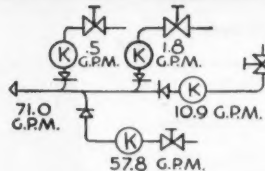
Automatic batch processes are easy when liquid ingredients are fed through Kates regulators and timer-operated solenoid valves. One timer can control all additives since individual flow rates can be set at each regulator. And it is easy to change proportions; just change the regulator settings.

### PRESSURE FILTRATION CONTROL



As filter cake builds up, a constant valve-jockeying is needed to smooth out flow. A Kates control in the effluent compensates for rising pressure drop, keeps filter at best rating.

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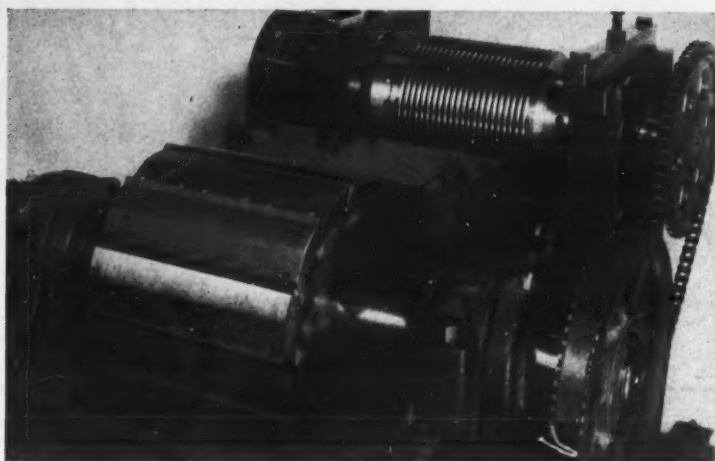
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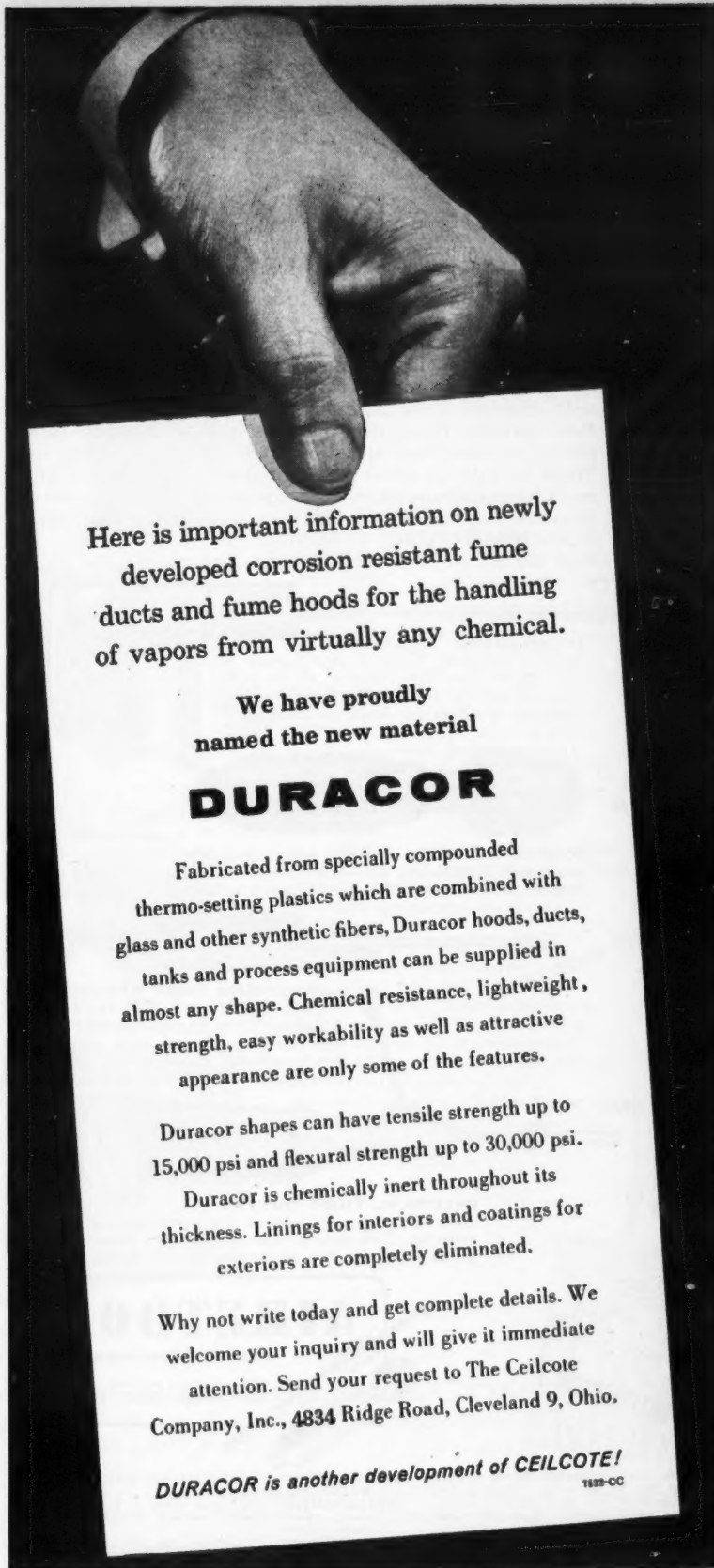
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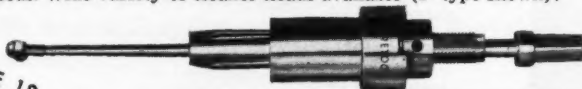
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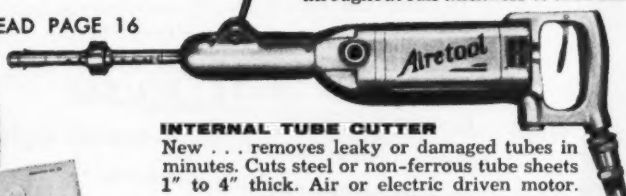
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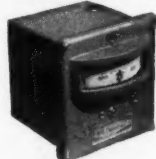
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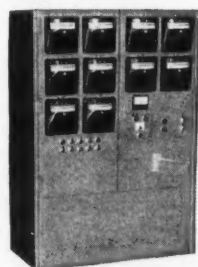
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Constructed of fine Teflon fibers tightly braided over a resilient core of glass fiber and impregnated with Teflon. Flexrock 405 is an excellent chemical packing. It is especially recommended for use against concentrated acids such as sulphuric, nitric, sodium hydroxide; alkalies, etc. Flexrock 405 Teflon Packing has a maximum temperature range of 500°F., and comes in sizes of  $\frac{3}{16}$ " to 1". Smaller sizes available with solid core.

\*DuPont's trade name for tetrafluoroethylene

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BROCHURE**



### FLEXROCK COMPANY

Mechanical Packing Division  
3611 Filbert St., Philadelphia 1, Penna.

Please send additional information on Flexrock 405 and other Teflon Packings.

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Name \_\_\_\_\_ Title \_\_\_\_\_

Check 2893 opposite last page.

### THAT'S INTERESTING

From page 5

#### Missile under glass

Component parts for the "brain" of Bomarc IM-99 intercontinental missile could fail because of a speck of dust. Particles from 60 to 100 millionths of an inch in diameter could cause as much friction as a handful of sand thrown into a ball-bearing assembly of conventional size. At Lear, Inc., assembly is performed in a special room within a room . . . under glass.

#### Blimp skin saves helium

Helium loss of naval anti-submarine patrol blimps has been cut 50% by a coated Dacron skin. "Envelope" comprises two layers of polyester fabric combined with an inside coating and binding layer of neoprene, and an outside coating of aluminized



"Looks like Ensign Jones forgot to allow for the extra lift that new skin gives his blimp."

Hypalon synthetic rubber. Covering not only cuts helium loss, but lighter weight permits greater fuel and equipment loads.

#### Newsprint and nylon

Nylon has invaded the newspaper world's pressroom. Time Inc., has a nylon letterpress printing plate in advanced experimental testing stage under actual production conditions. Plates are pre-sensitized and can be developed and etched in one step. Press runs in excess of 500,000 impressions are indicated.

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Made from metal sheath over ceramic insulated thermocouple wire.

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Check 2894 opposite last page.



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CHEMICAL PROCESSING



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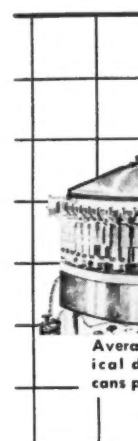
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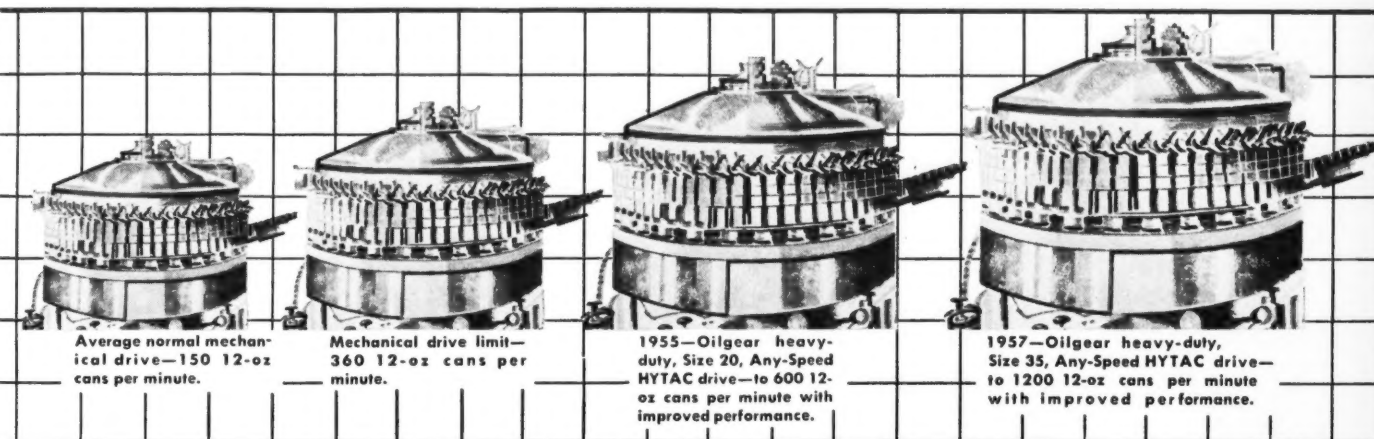
From Oilgear Application-Engineering Files

## HOW OILGEAR HYTAC DRIVES IMPROVE FILLER-CLOSER PERFORMANCE—TRIPLE OUTPUT

**CUSTOMER:** A Large Food Machinery Manufacturer (Name withheld by request)

**DATA:** This manufacturer called upon Oilgear to help solve the problem of producing a filling and closing machine that would exceed the mechanical drive limitations reached when the fill-close rate was increased from 150 to 360 12-oz cans per minute. *Summary of User Requests:* A fill-close rate of at least 425 12-oz cans per minute; accelerate to half speed in 2 seconds—to full speed in 5 seconds without jerky, jack rabbit

starts that strain the equipment; reduce spillage and "deadheads"; decelerate to stop in 0.4 seconds; reduce costly losses due to under or overfilling; change speed instantly, easily—with remote control preferred; accurately hold any selected speed regardless of load or electric power variations—viscosity changes; impervious to daily sanitary washdowns; provide trouble-free, low-maintenance, continuous operation.



Average normal mechanical drive—150 12-oz cans per minute.

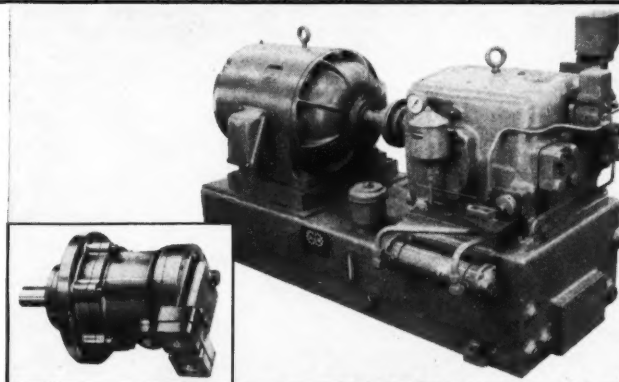
Mechanical drive limit—360 12-oz cans per minute.

1955—Oilgear heavy-duty, Size 20, Any-Speed HYTAC drive—to 600 12-oz cans per minute with improved performance.

1957—Oilgear heavy-duty, Size 35, Any-Speed HYTAC drive—to 1200 12-oz cans per minute with improved performance.

**OILGEAR SOLUTION #1 (1955)** Oilgear heavy-duty, Size 20, Any-Speed HYTAC (hydraulic tachometer) drives provided the first step in meeting user requests. These drives on a 6-spindle closer and 60-spout filler smoothly accelerated to full speed in 2 seconds—decelerated to stop in 0.2 seconds; a new, high fill-close rate—to 600 12-oz cans per minute without machine redesign; held any preselected speed within  $\pm 0.5\%$  regardless of load, electric power variations or viscosity changes—assuring uniform fill; reduced spillage and conveyor jams. Oilgear heavy-duty HYTAC simplified machine design and reduced maintenance by eliminating slip clutches and electric brakes—and by providing hydraulic cushioning; hydro-dynamic braking; automatic, positive protection against starting and running overloads. Remote, space-saving pump and motor location and completely sealed, leak-tight system provided protection to daily, sanitary washdowns. Users liked this improved performance and speed . . . over 50 similar installations have been made. Some users, however, continued to request higher production rates—with all of HYTAC's advantages.

**OILGEAR SOLUTION #2 (1957)** Due to the proven ability of Oilgear application-engineered, heavy-duty, drive and control systems to help meet user demands, this manufacturer naturally turned to Oilgear for further engineering teamwork in meeting new, greater production requirements. **RESULT**—new, higher production filling-closing machines that **TRIPLE** original mechanical drive output—to 1200 12-oz cans per minute with all the same desirable features outlined in the previous installations. One important addition has been made . . . new user satisfaction.



This is the newest Oilgear Power-Pak for filler-closers—Oilgear heavy-duty, Size 35 HYTAC drive components. Unit can be remotely mounted and remotely controlled for new performance, new production speed, new accuracy.

Here is but one reason and proof why designers and builders of machinery turn to Oilgear . . . why users recognize and trust the name . . . why more and more this phrase is heard, "For the lowest cost per year—it's Oilgear!"

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**CORROSION'S FOCAL POINTS** are easy to detect with a new Amercoat testing method using iron and caustic indicators in a saline gelatin bath. On the welded and scored steel panels shown above after test, unworked surface areas turned red to indicate cathodic properties; but the weld, scores and edges turned

blue (here shown blackened) to reveal themselves as anodic corrosion breeders. Rivets, threads, crevices and abrasions also show anodic under test. Unless such areas are effectively sealed from moisture, oxygen and ions they will erupt as focal points of corrosion cells.

## How to protect "trouble spots" against corrosion

Ask a corrosion engineer where metal corrosion is likely to attack first. Chances are that he will name rivets, threads, sharp edges, angles, crevices and welds. These are the areas of stress concentration, work hardness, fissures and abrasions. They tend to be anodic and actually breed corrosion. And although they warrant increased protection, conventional coatings pull away from their sharp profiles and leave them inadequately covered.

Amercoat No. 87, a true vinyl mastic, protects these spots in a single coat 10 mils thick, whereas other coatings fail to build 5 mils in three coats. It cuts maintenance painting costs up to 50% because you don't have to erect staging and scaffolds for additional coats, and you get results that last.

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